Australian Personal Computer

DATA GENERAL 25-LINE LCD BENCHTESTED

ISSN 0725—4115 NZ $3.50
REGISTERED BY AUSTRALIA POST PUBLICATIONS VBP 3691

JANUARY 1985 $2.95

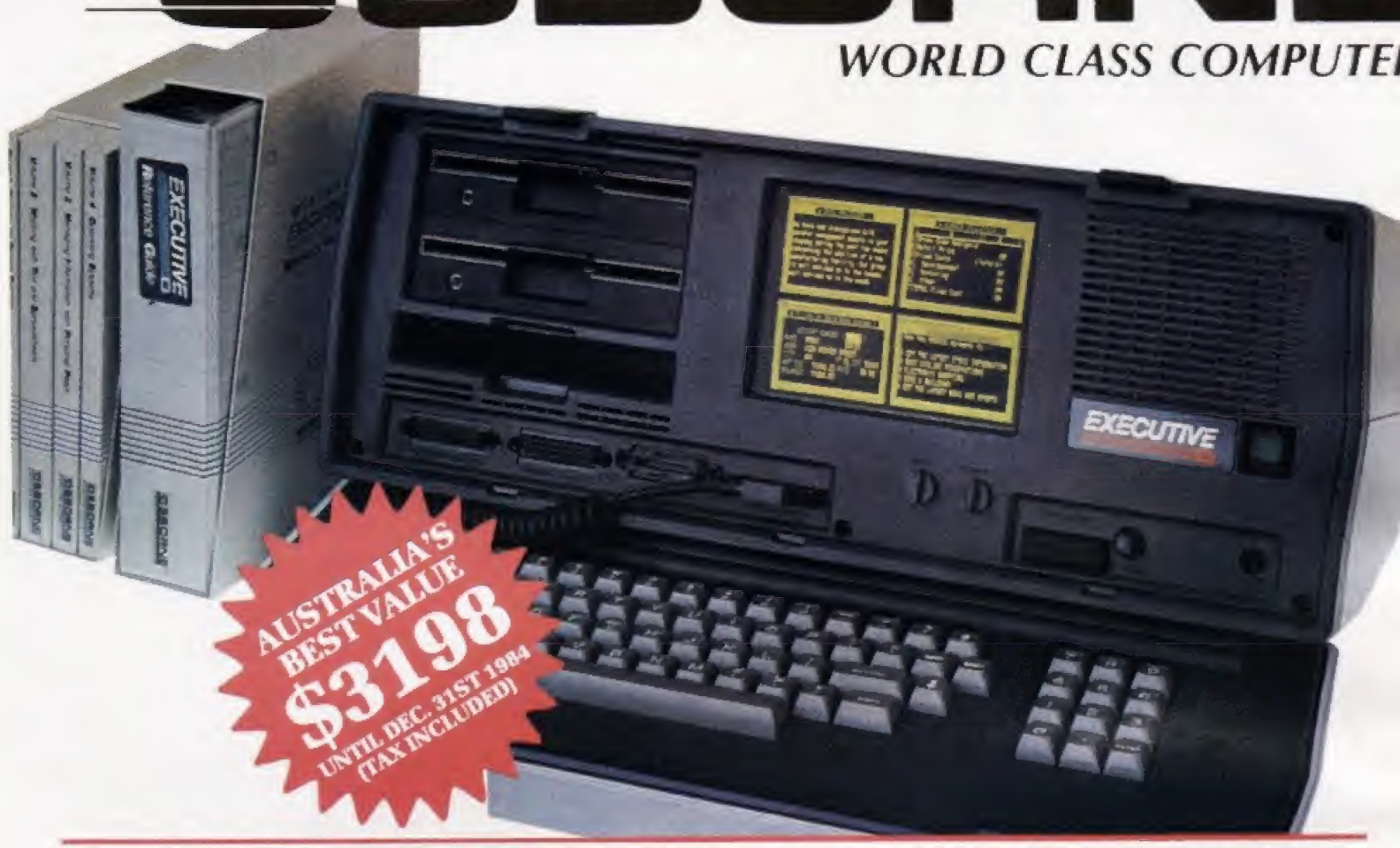
AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE

TELECOM'S COMPUTERPHONE

Personal computing takes a whole new direction

OSBORNE

WORLD CLASS COMPUTE



INTRODUCING OSBORNE

SUPER DEALERS

* Five star treatment from your Osborne Super Dealer.
* In-house customer training facilities.
* Staff specially trained in all aspects of Osborne's expanding range.

NEW SOUTH WALES
Delta Computer Systems — PARRAMATTA (02) 633 4055
Foremost Office Equipment — PARRAMATTA (02) 635 5477
Landlink — TAMWORTH (067) 65 4622
Prestige Office Equipment — BURWOOD (02) 745 2977
S.C.C. Computing — SYDNEY (02) 290 1122

AUSTRALIAN CAPITAL TERRITORY
Boulevard Business Services — CANBERRA (062) 48 5411

NORTHERN TERRITORY
Computer Sales & Leasing — DARWIN (089) 84 4656

QUEENSLAND
Scarborough Fair Computers — SOUTHPORT (075) 32 5133
Byte Shop — NEWMARKET (07) 352 6621
Town and Country — TOWNSVILLE (077) 75 4000

SOUTH AUSTRALIA
Myer Computer Centre — ADELAIDE (08) 217 0123

VICTORIA
Data Parts — SHEPPARTON (058) 21 7155
— ALBURY (060) 21 8080
— BALLARAT (053) 31 3399
— BENDIGO (054) 43 4866
Direct Data — ARMIDALE (03) 20 6949

TASMANIA
Strawberry Enterprises — BERRIEDALE (002) 72 2621

WESTERN AUSTRALIA
Bssie Computers — CLAREMONT (09) 384 5787
Country Soft — VICTORIA PARK (09) 362 6416

PHONE OSBORNE AUSTRALIA FOR COMPLETE DEALER LIST

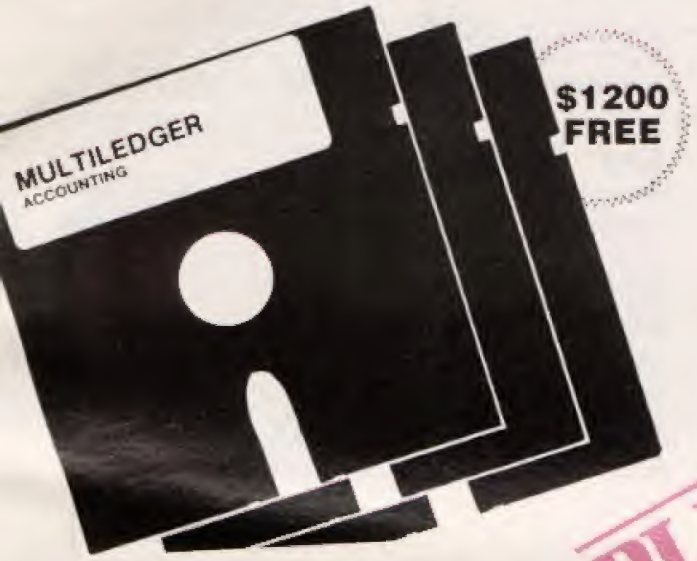
Now in stock TRANTOR hard disk drives with 5MB removable disk. Only $3595 for 10MB. Comes ready to connect and ready to run. Osborne Disk Manager software has full 6 months warranty.

EXECUTIVE 1

is Australia's No. 1

FREE STAR USERS MANUAL WITH EACH PACK PURCHASED

Now OSBORNE reaches for the STAR



We Give You More

Included in our one low price. Purchase an Osborne Executive before December 31st and receive this accounting package worth $1200 for free.

IF IT CAN'T BE DONE ON THIS SYSTEM — IT CAN'T BE DONE.

The Osborne Executive with complete software, MULTILEDGER, Dot Matrix Printer and 6 months nationwide service and backing.

YOU PAY ONLY $3248

PLUS . . .

If you twist your Dealer's arm . . . a high-speed Star Gemini 10X 120cps fat Dot Matrix Printer, including interface to Osborne, will be included for only

$50
WORTH $575

Total package worth $8336. But until December 31st you pay only $3198 plus $50 for printer.
(TAX INCLUDED)

The **MULTILEDGER** Accounting System includes a complete General Ledger, Debtors System & Creditors. It is written in Australia and developed for total compatability with the **EXECUTIVE.**

Along with **MULTILEDGER** you will also receive the extended **OSBORNE EXECUTIVE** Software package.

- CP/M 3.0 Plus, advanced CPM operating system
- Wordstar, wordprocessing and Mailmerge
- Supercalc, spreadsheet and Financing Modelling
- Personal Pearl, full database management
- BASIC and MBASIC, Programming languages
- CSD, p-System Universal Format system
- Over $400 worth of CP/M 3.0 Utility programs
- MAC Assembler etc.
- Character generator — for any language.
- NOW — Terminal Emulation is here —

OSBORNE AUSTRALIA (02)290 1122

3RD FLOOR, 93 YORK STREET SYDNEY

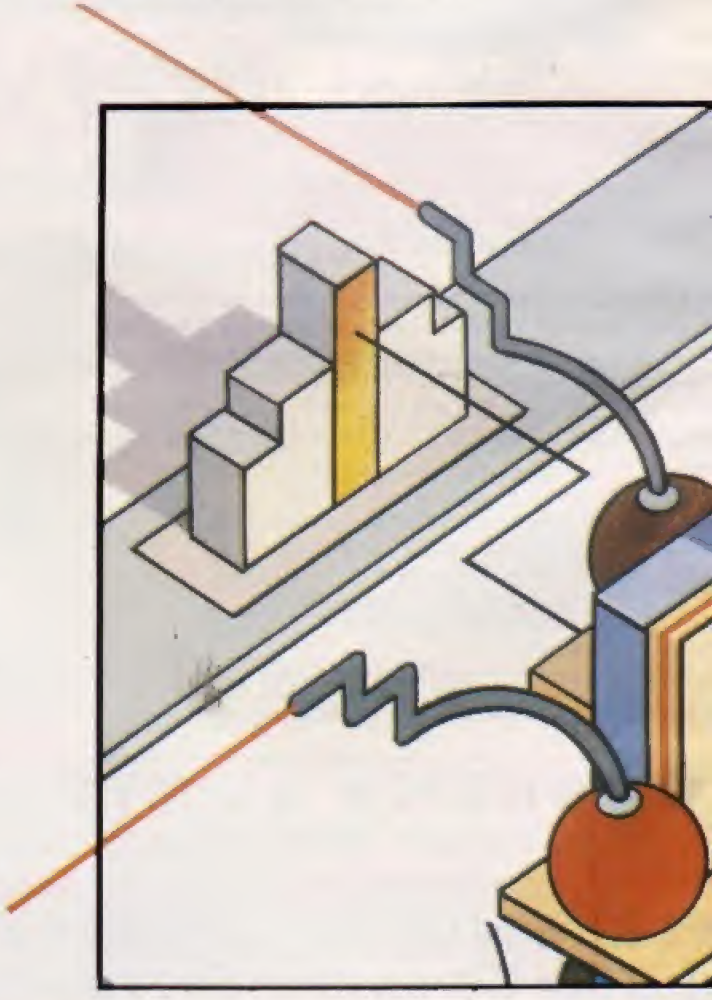
FULL 6 MONTHS WARRANTY ON OSBORNE by Hills Computer Service in your capital city.

PARTS AND LABOUR

inside

Managing Editor Sean Howard; *Consultant Editors* Steve Withers, Ian Davies; *Advertising Manager* Mark Reiss; *Sales Executive (NSW and Qld)* Simon Tindall (02) 268 0666; *Sales Executive (Vic, WA, Tas)* Sean Carnell (03) 531 8611; *Graphics and Typesetting* Graphic Heart Pty Ltd; *Subscriptions Manager* Valerie Meagher. Subscription rates: Australia $35.00 per annum. Overseas A$47.00 (surface), A$ (airmail). Printed by Quadricolor Industries Pty Ltd. Published by Computer Publications Pty Ltd, a subsidiary of Consolidated Press (Holdings) Ltd. 77 Glenhuntly Road, Elwood, Victoria 3184. Telephone (Editorial Publishing): (03) 531 8411. Telex: AA 30333 AMJ. *Distributors* Network Distribution Co. 54 Park Street, Sydney 2000.

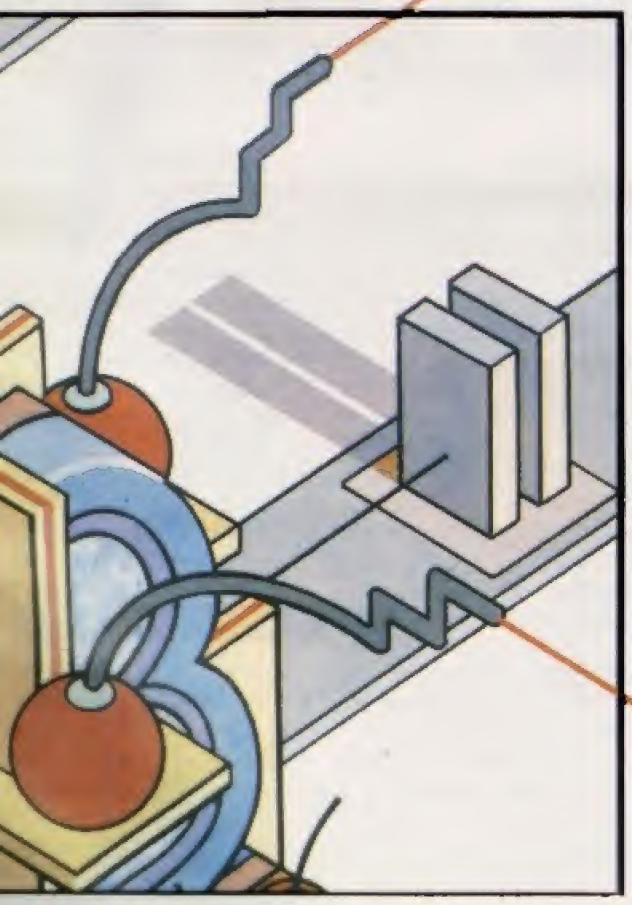
REGULARS



Volume 6, Number 1, January 1985

APC

FEATURES AND SERIES



BENCHTESTS & REVIEWS

By cutting out this page now, you'll cut all the dead wood out of your PC market in '85.

An audience of 27,000 business and professional personal computer prospects is a sales opportunity I can't afford to miss – especially when all my major competitors are there in force.

With Australian Exhibition Services' record of four highly acclaimed PC Shows in Sydney and Melbourne and the editorial backing of Australian Personal Computer magazine, Melbourne's PC85 is a marketing 'must'.

Please send me everything I need to know about PC85, including a colour brochure outlining space rates and details of services provided. I also understand that my name on this coupon does not represent a commitment on my part.

To: Australian Exhibition Services Pty Ltd,
Suite 3.3 Illoura Plaza 424 St Kilda Road Melbourne Victoria 3004
Telex AA39329 Telephone (03) 267 4500

Please print in block capitals:

Company _____

Address _____

_____ Postcode _____

Contact _____ Title _____

Telephone _____ Telex _____

General description of products to be exhibited _____

Rex Archer Emery AES426

THE FIFTH AUSTRALIAN
PERSONAL
COMPUTER
SHOW
WORLD TRADE CENTRE
PC 85
MELBOURNE 17-20 JULY 198

NEWSPRINT

Intrepid reporters from the four corners of the Earth bring news of super large capacity floppy disks; mainframe software producers acknowledging there's money to be made in the PC market-place; a quick history of PCs in Australia; and more in this month's Newsprint.

IBM's latest weapon — the 'Fear Factor'

As 1984 drew to a close, US microcomputerdom was taking stock and pondering the future. This has been the year that the optimists' projections proved to be a bust; what will 1985 bring?

For a start, the era of venture capitalists in microcomputer products is probably over. At the Comdex show in Las Vegas there was little of the manic enthusiasm of previous years, when dozens of hopeful start-ups burning venture capital brought new machines and/or new software to the show. Instead there were a few innovative lap-held machines such as the Data General One and the Texas Instruments Pro-Lite, and all were conspicuously IBM-compatible. The only big software announcement was of Lotus's Jazz (1-2-3-4!) for the Macintosh, which wasn't even announced at the show since Lotus refused to spend $500,000 on a booth and instead took reporters off to a converted hangar.

Nor was Las Vegas as welcoming as in previous years. The word is out on computer conventioneers — they don't drink much, they don't stay up late, and they sure don't gamble in hotel casinos. No wonder some hotels this year refused to take any of the poor unhappy things.

Why unhappy? Why such concern for the future? Well, regular readers may recall IBM's cherished dream of a Blue World in which all computing is done on IBM machines. That world continues to draw closer. Indeed, as IBM continues to lower prices, the remaining IBM clones may be driven out of business. Nor does the other US giant, AT&T, seem to really understand the micro business or be prepared to compete effectively. Now IBM is angling hard for the software market and the big fear is on.

Ben Rosen, New York venture capitalist, chairman of Compaq, and the key investor in Lotus 1-2-3, says venture capitalists evinced 'extreme reticence now to get into anything that could be in IBM's playpen. IBM is having a chilling effect on new ventures, a fear factor'. (Note: micros still account for only 14 per cent of IBM's $45 billion revenue).

Even Kaypro, sturdy defender of 8-bit CP/M, gave in and announced the Kaypro 16, an IBM compatible with 256k of RAM and both hard and floppy disks. This for $3,295. 'It's what our dealers asked for,' said a Kaypro spokesman.

Not all the blame can be laid at the door of IBM, however. On Wall Street the big institutional investors such as Morgan Guaranty and Bankers Trust (with portfolios worth $18.7 billion each) are not interested in dangerous hi-tech stocks that nose-dive shortly after introduction (for example Eagle Computer, which made a $12 a share issue that now lurks in the 80 cent range).

Even IBM's stock, despite consistently excellent earnings, has swung between $99 and $128 this year.

This is a huge range for such a solid blue chip and evidence of the volatility in a stock market where money managers, working for the institutions, are desperately churning stocks around in search of fractional profits to make their monthly targets.

Since the small investors have largely fled the stock market in recent years as a result of such volatility, the big institutions are the whole ball game. It is to them that the venture capitalists must go for the money to fuel little start-ups like Apple and Lotus. The venture capitalists can no longer expect to find funds for further IBM clones.

One interesting pointer on next year's business was provided by Software Access, a Californian market research firm. Its study showed that only 13 per cent of people without computers have any plans to buy one in the next 12 months. In contrast 37 per cent of home micro users and 52 per cent of work users expect to buy *another* computer in the same time period.

Which means an experienced marketplace with very choosy consumers who will be looking for extra points of value and usefulness in shaping their decisions.

Enter a familiar figure in the micro market. Jack Tramiel says US manufacturers have become 'greedy' and 'too dull'. His new Atari Corporation is preparing two 8-bit machines, two 16-bit, and a 32-bitter for releases beginning in January. Tramiel, of course, has shaken up US microcomputerdom before — and with any luck he'll do it again in 1985.

Chris Rowley

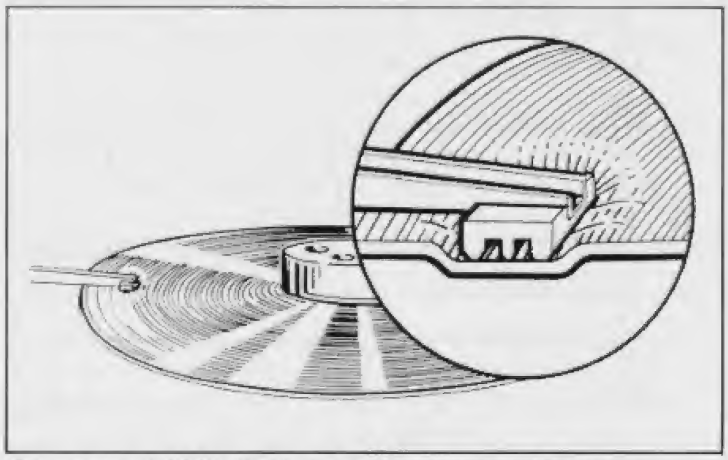


Diagram of 3M's SSR disk showing the dimpling effect of the disk's surface

5Mb Floppies

"Stretch-Surface Recording" may change the future of conventional disk drives, according to 3M, by offering the benefits of hard disk storage at close to floppy prices.

The patented 3M SSR technique uses a rigid plastic disk with raised edges. A 60 micron thick flexible media membrane is stretched across and slightly above both surfaces of the disk — the assembly resembling a small shallow drum.

Slightly modified magnetic read/write heads fly just above the surface recording media which rotates at a whopping 3,400 rpm. Air pressure causes the membrane to dimple beneath the head leaving a gap of about 5 microns. Because the membrane is stretched tightly the continually moving dimpled area restores itself rapidly, flinging off

Twelve awkward questions that will tell you if a PC is productive.

1. Is it a 16-bit model like the AWA Corona - powerful enough to cope with all your business requirements?

2. Is it fully compatible with readily available IBM PC software, like the AWA Corona?

3. Has it got at least 256 K bytes of memory like the AWA Corona?

4. Is the memory expandable beyond 512 K-bytes like the AWA Corona's?

5. Has it got a much sharper screen definition than the IBM PC? The AWA Corona has.

6. Can it take hard and floppy disks, as with the AWA Corona?

7. Is there a choice of desktop or portable model like the AWA Corona?

8. Can you buy the complete system for around $5000? (The AWA Corona starts from around $4500).

9. Does 'complete' mean the screen is included in the price, as with the AWA Corona?

10. Does it include the MS-DOS,[1] GW BASIC,[2] PC Tutor[3] and MultiMate[4] professional word processing system like the AWA Corona?

11. Is it fully backed and serviced by the company that supplies it to you, like the AWA Corona?

12. How quickly could you have one? Call AWA now.

For more information write to: Corona PC Co-ordinator, (AP), AWA Computers, 132 Arthur Street, North Sydney, NSW 2060.

Name _____ Position _____

Company _____

Address _____

_____ Postcode _____ Telephone _____

AWA COMPUTERS

Phone: NSW: (02) 922 3300. VIC: (03) 529 4133. ACT: (062) 47 7522. QLD: (07) 359 3577. SA: (08) 333 2044. WA: (09) 321 9334. TAS: (002) 34 4532. AUCKLAND: 760 129.

AWA Computers Division. Amalgamated Wireless (Australasia) Limited incorporated in NSW. IBM is a registered TM of International Business Machines. 1. TM MacWorth. 2. TM Microdata. 3. TM Comprehensive Software Support. 4. TM Multimate International.

debris during each pass in a rampoline-like manner.

"It throws off dirt so well hat at Comdex in November, we ran 5Mb per side prototypes with the covers off and had a test rig highlighting disk errors", says David Clancy, 3M Australia's Data Recording Products Marketing Manager. "The rate was about the same as for sealed rigid disk drives — one soft error every 10 billion bits."

The new 3M disks are inherently rugged. Even deliberately 'landing' the head onto the membrane causes no damage or loss of data, according to 3M.

The membrane's resilience ensures that the drive is also less susceptible to impact damage. "We've dropped them from a height of three inches while they're running — without damage" says Clancy.

The disks are injection-moulded from a polymer-composite substrate formulated so that the disk expands and contracts with temperature at the same rate and by the same amount as the metal components of the drive itself — thus nullifying the effect of the dimensional changes.

The stretched membrane also remains dimensionally stable despite changes in temperature and humidity and exhibits low 'anistropy' that is, expands and contracts by similar amounts in all directions).

Stretched-surface pre-production units currently offer five megabytes per side (5¼ inch disks), using track densities of 345 tracks per inch. Spacing and density may be doubled in later units which are likely to have fixed storage capacities of 48Mb (37Mb for removable disk versions).

Hardware manufacturers in the US are currently evaluating the product, and commercial production of SSR disk drives is expected to start in mid-1985.

Clancy says that the introduction of SSR in Australia depends on the speed with which OEMs adopt the technology.

"This could be anywhere between six months and two years", Clancy said.

Meanwhile 3M is researching 'vertical recording' (particles oriented vertically rather than horizontally), a technique enabling density to be increased at least one hundred times.

If this technology can be combined with SSR disks, 3M reckons the way is open for 100 Mb-plus drives at virtually floppy disk drive prices.

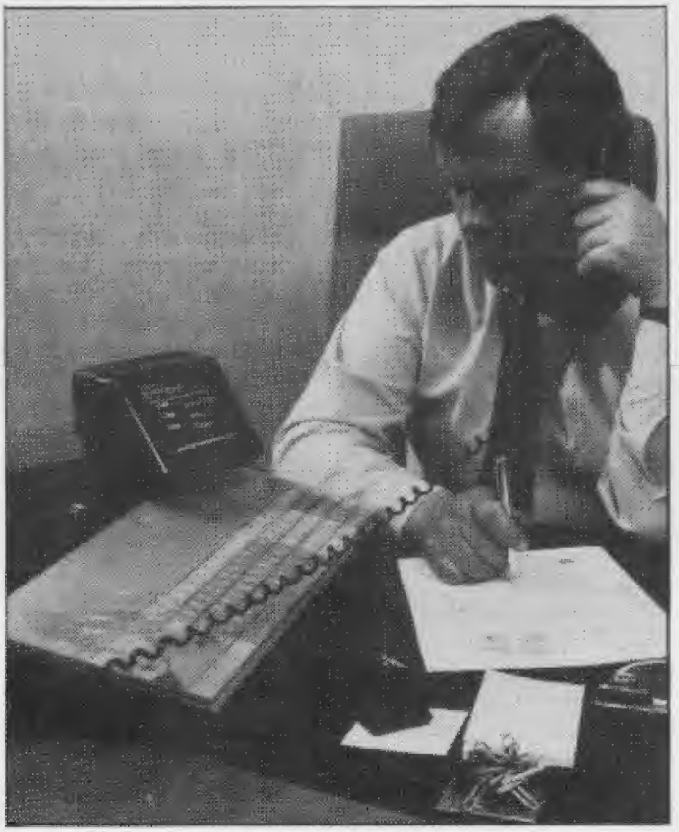
According to (US) Magnetic Media Information Services, if 3M succeed in producing such drives, they could "eliminate aluminium media from contention in small to medium sized drives . . . and most forms of tape-oriented back-up systems".

Mainframe software

Heard of Goldengate? — and I don't mean the San Francisco Bay bridge.

Heard of Cullinet? Well it's just about the biggest software company in the world and Goldengate is its new integrated PC software. It does all the sorts of things that Symphony and Framework do at about the same price and, more's the point, will talk to a mainframe computer as well, which is where Cullinet makes its money. It develops database systems, fourth generation languages and other fancy software for IBM mainframe machines and Goldengate is its first venture into the micro market.

The most significant point is that while Lotus, Ashton-Tate and their sundry distributors are spending mega-bucks trying to outsell each other in the retail arena, Cullinet is quietly and confidently directing its attentions to the corporate market with a fraction of the noise and razzle-dazzle of these parvenu PC software houses, and perhaps there's a lesson for them here somewhere.



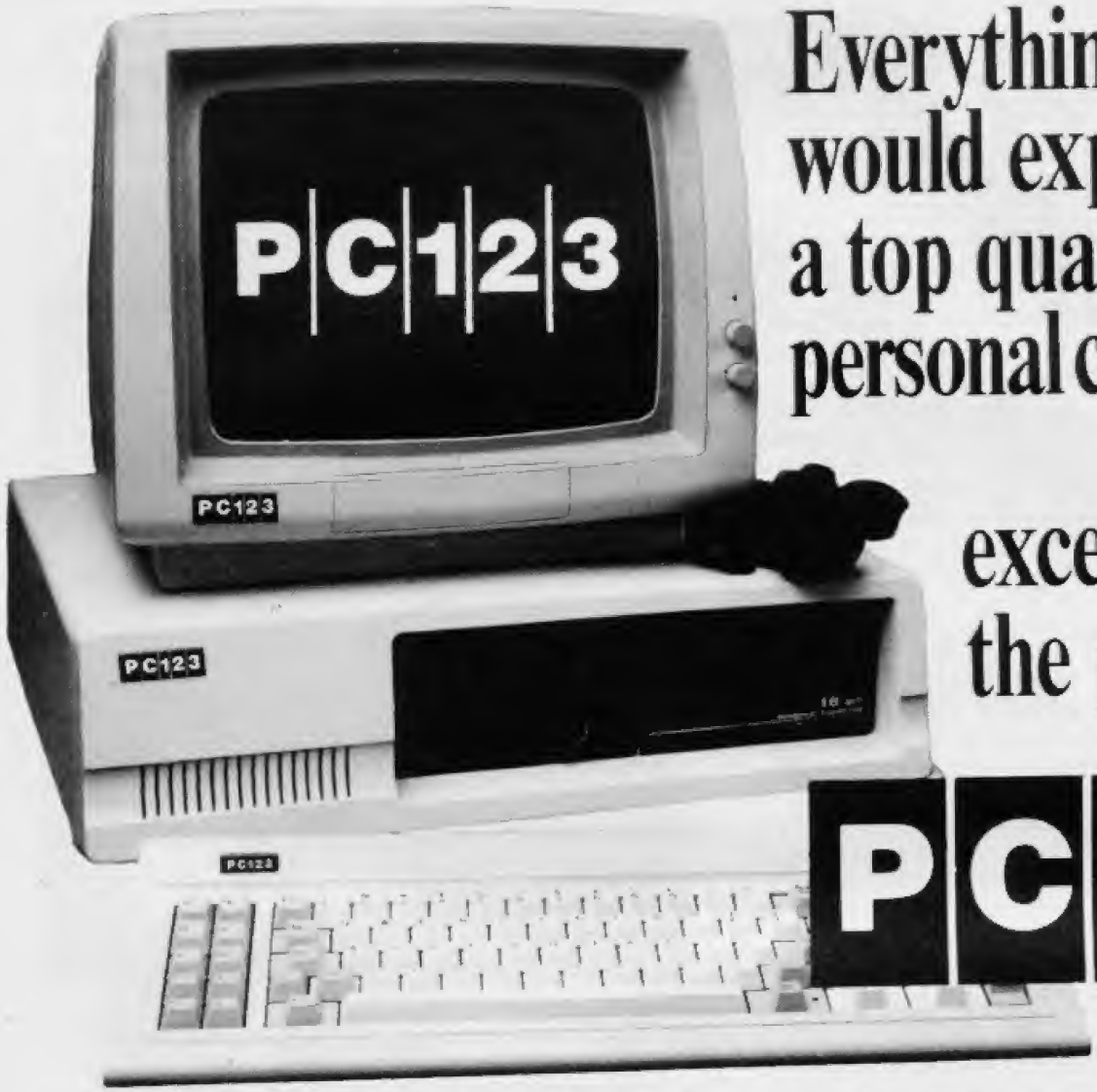
The British seem to have bounced out in front with the trendy new concept of combining the PC with the telephone. Above is the Executel, "an 'intelligent' telephone that fulfils almost all the needs of a business manager or company director" according to the PR blurb. (Presumably this excludes certain hedonistic delights.) It appears to offer less than Telecom's ComputerPhone in that it lacks business applications software (word processor, database etc) and a Basic interpreter. On the other hand it does have a 20 year diary, and something referred to but not explained: "a special secretarial extension". STC Telecommunications make it, if you're interested.

The people who are really going to use all these sophisticated new integrated packages are probably members of large organisations where much of the data they want resides on the company's mainframe computer and where corporate data processing professionals often say yea or nea to the purchase of PCs and software.

By the time it announced Goldengate in Australia, Cullinet had already sold twenty copies to a large and prestigious user, the United Permanent Building Society. In fact the society had been beta testing Goldengate for some months and was reported to have chosen it, along with Cullinet's mainframe database, because Cullinet offered a range of products to meet UP's needs across the board, from mainframe database to PC spreadsheet with a link between the two.

The Lotuses and Ashton-Tates of this world can't hope to be so comprehensive, but another recent announcement highlights the fact that it's an important area.

The US company Informatics General (whose products are distributed here by Datec Pty Ltd) released Answer/DB, a product



Everything you would expect from a top quality personal computer...

except the price tag.

PC123

The PC designed for a hard day's work

Ask any hard working businessman or woman what they want from a personal computer and one requirement will stand out above all others... **RELIABILITY.**

The PC123 system is designed with this in mind. Using only the finest quality components and years of practical know-how, we have created a powerful versatile PC with in-built reliability.

PC123 is ready to work as long and as hard as you are.

PC123 has a huge range of business applications — stock records and book-keeping tasks through to the most complex market analysis, word processing or accounting systems. The list of compatible IBM software is almost endless, allowing you to easily tailor-make a system specifically to your needs and your budget.

PC123 is equally at home in a large organisation or a small business.

The system offers today's forward-thinking small businessman a competitive edge through quick, easy access to sales, marketing and financial data.

PC123 is manufactured by Taiwan's largest company, taking advantage of their vast technical and financial resources and manufacturing know-how plus extensive long-term R & D carried out by top engineers in their U.S. subsidiaries.

DEALERS, DISTRIBUTORS, OEM ENQUIRIES WELCOME

Standard Features

- 8088 processor with 8087 socket
- 128K RAM expandable to 768K
- Colour graphics card with TTL and NTSC output
- 1 parallel port and 1 serial port
- 2 slim line disk drives — 720K
- MS DOS 2.11 plus manual

Options

- 10 MB hard disk
- Chinese character adaptor

Compatability

- IBM hardware and software
- Runs Lotus 123, Open Access, Flight Simulat Framework, PFS, dBase II, under PC DOS, concurrent PC DOS and thousands more

**Special for limited period only — high quality, high resolution 640 x 720 dots RGB monitor at below cost: $450 excluding tax.

Now available at following fine computer outlets:

JBC COMPUTING (071) 44-5870 (Sunshine Coast)
STEVES COMMUNICATIONS (062) 80-6877 (Canberra)
AUTOMATION STATHAM (02) 709-4144 (Sydney)

PLEASE SEND ME THE LATEST INFORMATION ON PC123.

Name .....

Address .....

..... Postcode .....

Phone .....

micro station

DISTRIBUTORS FOR QUALITY MICRO COMPUTERS AND PERIPHERALS

Suite 46, Level 12, 95-99 York Street,
Sydney, N.S.W. 2000.
Telephone (02) 290 1514. Tlx. 27585.

which allows users of PCs to obtain data held on an IBM mainframe. The PC components of the product have been designed to interface to specific software packages. They have been developed in collaboration with the manufacturers of those packages — Lotus, Ashton Tate and Visicorp.
Chris Kirkby

Users caught by IBM blind date

JAPAN — Among the various bits of flotsam and jetsam that find their way into my possession is a somewhat tattered copy of the current issue of the *Tokyo PC News*, newsletter of the Tokyo IBM user group. In some ways, it reminds me of those songs and poems that have something good happen, only to be followed immediately by something disastrous.

Like you show up on a blind date to be greeted by a vision of loveliness that makes Helen of Troy look like one of Cinderella's ugly sisters only to discover she has breath so fetid it would stop a train only to discover that she breathes but once an hour only to . . . I'm sure you get the picture.

Anyway, the good news is information on how to stuff an IBM PC with oodles of RAM at what look to me like great prices. For example, a 128k expansion board for my computer with discount costs about 40,000 yen ($200).

If an IBM user buys an expansion board without chips (there's no indication of what the board costs), 256k chips run at about 8,000 yen ($40). There's also information on who to buy the boards from in the US with a warning not to have them X-rayed.

It's the sourcing in the US that's the train stopper.

Not all the IBM PCs used in Japan, or even just by the club members for that matter, were sold in Japan. In fact, many of the members are of the growing fraternity who come and go on the whim of their multinational employers — banks, insurance companies, manufacturers, advertising agencies, etc.

Sensibly, when they acquire a personal computer of more than games capability they don't want a product from some fly-by-night company whose address may quickly change from Silicon Valley to Death Valley, so naturally, they turn to IBM. They expect, at the very least, that with its global operations, IBM will be able to service their hardware, maybe even answer a few questions about operating systems and software no matter where in the world they use it.

Surprise. Surprise. That kind of thinking may well serve in other corners of the world, but it gets them nowhere over here.

The IBM PC in its various configurations including the Portable PC (just the thing for the busy world traveller) is sold exclusively by ComputerLand Japan who in turn purchase its machines from a division of IBM in the US which handles sales to foreign countries.

And it is to ComputerLand Japan that Mr Rising-International-Executive is referred when he calls IBM about getting some service for his not-purchased-in-Japan IBM PC. IBM Japan, he is told, wants nothing to do with it, despite its international warranty.

Since ComputerLand Japan has not seen one thin dime of profit on the particular faulty machine in question (all profits went to some other retailer and IBM), they don't have a lot of interest in servicing it. But they will, if the owner takes out a yearly service contract for ten per cent of ComputerLand's retail price for the machine in Japan. (Thanks to duty, transportation and a surcharge imposed by IBM in the US to compensate its local subsidiary, this amounts to a premium of some 60 per cent over the price for the same unit in the US). Thus, it can cost you some $700 or more just to be told you've a blown fuse.

Naturally, IBM users that didn't originally purchase their machines from ComputerLand Japan (who quite innocently is catching a lot of flack but can't be expected to look after IBM's spilled marbles) are rather put out with IBM, or Big Blue Meanie, as they are wont to call the company here these days.
Serge Powell

Jazz

Apple wasn't wrong when it said there'd be a wave of new software products for the Macintosh. Lotus has made a surprise announcement (well it surprised us) of Jazz, an integrated package including word processing, spreadsheet, database, communications and graphics. Obviously you'll need a Mac to run Jazz but you'll also need 512k of RAM and an external disk drive.

We haven't seen Jazz yet, but according to its Australian distributors, Imagineering, it utilises Mac features such as the mouse, pull down menus and multiple windows.

Existing Lotus product users would be interested to know that Jazz's communications capability allows transfer of data from 1-2-3, and Symphony files.

Jazz will sell for $845.

Chat-up a Mac

The Macintosh can talk — I've heard it. Chirping away cheerily with the aid of a demo disk from First Byte Software called Smoothtalker.

I was fascinated and it set me thinking about possible applications, especially when speech synthesis becomes a bit more sophisticated, as it is bound to do pretty quickly.

Smoothtalker requires no additional hardware — the audio circuits in the Mac are apparently capable of producing speech given the right kind of software. Although it will be available as a retail product (about $150 in the US) Smoothtalker is aimed at software developers who wish to include speech in their programs. It consists of two parts: one to synthesise predetermined messages in a program and one to convert data from the keyboard into voice messages. Each module will, First Byte says, take up just over 20k of RAM and may be purchased separately.

The way it works, I am told, is by analysing words into 41 different speech elements known as phonemes. It applies about 1000 'rules of English' to make sure it gets things right. So it can handle punctuation, abbreviations such as Dr, Mr, Mrs and figures like $145.69 which it will duly announce as "one-hundred-forty-five-dollars and sixty-nine cents."

With such prowess presumably those little irregularities of our tongue which are the bain of English language students would be no trouble at all to Smoothtalker. I'm thinking of words like cough, bough and dough for example.

Much as I would have liked to try and trip up the synthesised salesman on the demo disk, I couldn't — it doesn't include the module for converting input into speech.

It did, however, run through the gamut of its talents: talked fast, talked slow; spoke high, spoke low; shouted loudly and whispered softly.

Anyhow, enough of technicalities. As I said, what really got me thinking were

the possibilities when its developers figure out how to incorporate a few of the subtleties of human speech. Those little nuances which make all the difference between 'hello' as in 'it's great to see you' and 'what do you want, nuisance!'

Then Smoothtalker could become cajoling or caressing, assertive or appealing, angry or amorous. Add to this capability some advances in those psycho-software products and a personal computer could become a personal friend, guide, guru and counsellor all rolled into one. It could spell the end of self transformation courses, cults, personality shaping schools, rebirthing courses and pseudo-psychologists of every hue.

Just sit yourself down in front of your friendly PC (which would of course greet you with a cheery "good morning/afternoon/evening John/Fred/Fredrika" or whatever as soon as you booted it up) and answer the questions yes or no, so the machine can suss out your particular hang-ups and instant therapy will spew forth from its speaker. Or you could plug in an under-pillow speaker, and remodelling of your psyche could be yours while you sleep.

If you think this is the stuff of science fiction — well I hope you are right, but on a more mundane level there's great potential in educational software. Rewarding positive behaviour and punishing negative behaviour are, according to educationalists, highly effective ways of getting people to learn things or change their behaviour, which is supposed to be the same thing.

Educational software seems to exploit this fact by playing tunes or emitting an electronic raspberry or showing a smiling face or a sad face. Software with synthesised speech could be so much more personal and congratulatory, or equally personal and punitive. "No Peter, two and two does NOT make five".

Well I'm sure you could think of a dozen more applications. One thing's for sure, you'd never be alone with a Macintosh.

Perhaps the salesman who recently said to me that he could forsee the day when personal computers would be a substitute for pets wasn't as far off the mark as I'd first accused him of being. "They'll never replace cats" said I. Computers after all don't shed their fur, need feeding, have kittens, make a mess on the floor. And cats can't talk. But, and it's a big but, they are alive and computers aren't . . . yet.

Chris Kirkby

Pretty pics, but how useful?

It's pretty well known that the art of business graphics was reserved for the specialist until the PC came along. The products to produce all those fancy pie charts, bar charts, scattergrams, histograms, and what have you were enormously expensive and definitely not designed to be used by your average executive who just wanted to tart up his next presentation a bit.

The PC, Lotus 1-2-3 et al, colour printers and the Pallette slidemaker have changed all that. Now anybody can produce the most stunning visuals with an outlay of less than $A15,000. There's just one small problem: what do you really do with them? I mean, it's all very well to sock it to your managing director at your next presentation with lots of beautiful pics in every colour of the rainbow but if you are trying to tell him that you've made 200% of budget in the last quarter, are you sure he'll see the wood for the trees?

There's lots of rules about visual presentations, such as what colours are most effective, what sort of graphs best convey the trend you're trying to show and so on. These have been known to specialists for years, but they don't generally come bundled with your graphics software package.

Help is at hand, though, from the Australian Institute of Management. Next February the Institute will hold its first workshop on the use of computer graphics in business. The course costs about $A200 and details can be obtained from the NSW Division, 215 Pacific Highway, North Sydney, NSW 2060. Tel: (02) 929 7922.

Chris Kirkby

Mistaken identities

In what appears to be a case of mistaken identity, Amust Computer Corporation Australia of 350 South Road, Moorabbin has continued to be confused with the company presently under official management called Amust Compak Manufacturing Pty Ltd.

To cite an example, just recently a realisation auction was held on behalf of the official manager of Amust Compak of plant and equipment used by them in the manufacture of their "Briefcase Computer". The auction was advertised in Melbourne newspapers and Amust Computer Corp. received some 40 phone calls from parties within and outside the industry enquiring as to viewing times to inspect the goods to be auctioned or when the company was to be liquidated.

Amust Computer Corporation is not the same as Amust Compak Manufacturing and Amust Computer Corporation has published disclaimers regarding any inferred relationship with Amust Compak.

New Sybiz software

Multi-user Sybiz integrated accounting software has been released for the 16-bit DOS operating systems.

The hub of the established single-user Sybiz is its general ledger module which receives postings from six other modules automatically. They are accounts payable, supplier orders, accounts receivable, inventory, order entry/invoicing and bill of materials. A report generator, payroll and advanced user module, which outputs data to popular spreadsheets, word processing and database packages are also available.

According to Sybiz Software none of these advantages are lost in Multi-user Sybiz as operating procedures on terminals remain unchanged.

Micro Fortran

Arcom Pacific has released Fortran, a full featured implementation to ANSI77 standard by Digital Research. It runs under CP/M-86, MS-DOS and PC-DOS. Fortran is particularly well suited for representing algebraic expressions for use in vector and matrix arithmetic and for solving problems requiring complex arithmetic.

Key features include: 8087 maths chip support and optimisation of small programs, overlay capability, extensive data type support, 64k element arrays, array subscript checking option, 40 character variable names and compatibility with other DRI products. 'Phone (07) 52 9522 for more details.

The story so far

The following is based on the 350 page Yankee Group

FRAMEWORK

Framework® is the first of a new generation of products that goes beyond today's integrated spreadsheets. It is an order of magnitude better than the original integrated products and windows.

The heart of Framework is a unique "frames" technology. Frames are actually self-contained, inter-related displays that can be nested, resized and relocated anywhere on the screen. Frames bring new flexibility to the way information is created and managed with a PC. With this truly three-dimensional design, the user can create infinite logical hierarchies of information, leading to as deep a level of complexity as needed for the task at hand. There is no limit to the number of frames that are active in the system. Framework's user interface is one of the most elegant designs yet conceived.

Word Processing

Framework's word processor is dynamite! It gives users the choice of frame or fullscreen viewing of documents, multiple margins within a single file, automatic justification and repagination, header/footers, page numbers and more. The streamlined menu system helps new users get started in a hurry and "shorthand" commands help veterans work even faster.

Outlining

The innovative and very powerful outline processor can be used as a standalone organizer or as a companion to the word processor. Using this outline mode, single ideas can be quickly captured and then expanded into fuller concepts and solutions. Any outline-frame or subheading within an outline can be instantly expanded to include text, spreadsheets, graphs or databases. Finally, with Framework, your PC is truly a thinking machine.

Database

Framework's database system can be learned quickly and put through its paces effortlessly because most commands are common throughout the entire program. Framework itself will handle most of your analytical information management needs, and if very large data handling is required, Framework is fully compatible with dBASE II®.

ASHTON·TATE

now available $795

FRAMEWORK™

Spreadsheet

Spreadsheets are simple to create, use traditional row/column or English-language cell addresses, can be linked to automatically update other files based on cell data and have an exclusive international numerics feature that will change entries to accurately reflect changes in currency denominations including the placement of commas and decimal points.

Graphics

The graphics portion of Framework has been designed to produce exceptional charts and graphs on standard monochrome monitors. Six of the most frequently used business graphs are built-in and can be automatically drawn and updated from data in spreadsheets and database files.

DOS Access

The new DOS access capability allows any user to actually run other PCDOS software inside Framework. This allows users to gather data from other programs without quitting Framework. It will be of great help to people who frequently shuttle between programs and to businesses who perform frequent interchange of programs or data with larger systems.

Custom Applications

Framework comes complete with its own programming language. Users can begin writing their own custom packages or use software developers right away. In addition, dealers will continue to receive the excellent support that has helped make Ashton-Tate the front-runner in the software industry with dBASE II and FRIDAY!

Hardware

Framework will run on the IBM PC, PC XT and all compatibles. It requires just 256K RAM and dual 360Kb floppy disk drives with monochrome display.

Availability

Framework will be available in Australia from the end of July. Contact your dealer end-June for more details or write to the Master Distributor, ARCOM Pacific, Freepost 2 (no stamp required), P.O. Box 13, Clayfield, Qld 4011.

arcompacific
software distributors & wholesalers

master distributors

Desk Top Computer Report, available to subscribers of the Yankee Group Research services:

The earliest indications that most Australians had of the impending personal computer revolution in Australia were a few articles in the press in 1978. Tandy began to make noises about its first rudimentary TRS-80 and the first news of the Apple-in-a-garage phenomenon had begun to leak through.

Hardly anyone took these rumblings seriously, considering the new machines to be little more than overblown calculators.

Then early in 1979, a few enterprising people organised a personal computer show in Sydney's Lower Town Hall.

The main machines on display were the Commodore PET, the TRS-80, the Exidy Sorcerer, and the Apple II. These four machines were to be the mainstays of the early years of microcomputing in Australia.

The models on display were very basic, with very few peripherals in evidence. For example, no disk drives existed — all the machines were tape-loading. The standard of software offered was nothing more than a few vendor-produced programs written in rather basic Basic.

Even so, most people who attended the show could not fail to be impressed, because it was obvious that these machines were far more than calculators, and that a new era in computing was about to begin in Australia.

The biggest impetus to the local industry was given by Rudi Hoess who started the first Australian ComputerLand store in Sydney, and organised the first local Apple dealership. He franchised stores in other capital cities and by the end of 1979 had five stores, selling mostly Apples. At the same time the Tandy and Commodore stores were expanding and Tandy successfully introduced the TRS-80 through its network of retail stores.

The Sorcerer, meanwhile, was selling reasonably well through Dick Smith's electronic stores. Definitely a machine for the hobbyist, it pioneered the ROM pack — solid state software which plugged into the machine. This idea still has validity today as a possible replacement for mechanical disk drives.

The Apple II dominated the market until 1981. Rudi Hoess expanded his organisation, and Apple grew as a product as more and better software and peripherals came on the market.

The microcomputer explosion truly began in 1981. the best indication of this is in the massive increase in computer stores in that year. ComputerLand outlets doubled and the number of Apple dealerships trebled. Tandy began to organise more computer-only stores, and many independent dealerships sprang up.

Massive growth was the dominant feature of the Australian microcomputer industry in 1982. The market became overcrowded and discounting sent some of the smaller dealers to the wall.

The biggest personal computer show of 1982 was "Applefest", organised by Hoess's Electronic Concepts. It marked the high point of Apple's dominance of the Australian market. Apple established a corporate presence in Australia to prepare for the takeover of the local distributorship, which happened in May 1983.

January, 1983 began with the belated release of the IBM PC in Australia. This release was important for a number of reasons. Firstly, it legitimised the personal

NEWSPRINT

computer. The entry of the world's largest computer maker into the fray brought new respectability to the small computer market. The strength of IBM as a company made the IBM a de facto standard.

After the announcement of the IBM PC, software developers began to write for the new 16-bit standard. Many companies felt obliged to follow IBM's wagon, and develop "IBM compatible" machines.

The *APC* Shows from *Australian Personal Computer* and Australian Exhibition Services dominated the market, attracting crowds of 25,000 plus in Sydney and Melbourne.

May 1984 saw the introduction of the 32-bit Apple Macintosh, the first easy-to-use consumer oriented computer with a 'pictorial' operating system.

At the end of 1984, more than 140 brands of personal computer were available on the Australian market. The majority of new offerings were "IBM compatible" 16-bit machines.

In November, 1984, Digital Research, the originator of the first, and most popular personal computer operating system, CP/M, announced a new product: a common Macintosh-type easy-to-use pictorial user interface for all MS-DOS machines. Digital Research claimed this removed the need for strict IBM compatibility suggesting a more creative opening for computer products in 1985.

November also saw the introduction by Telecom of an integrated communications and computer device containing keyboard, screen, micro drives, telephone, telex, videotex, communications and voice synthesiser. ComputerPhone pointed the way to the desktop machine of the future decade.

AAP introduced the first microwave service for personal computer users.

The Aussat satellite was oversubscribed, and the launch of the third satellite was put forward to 1986.

Telecom announced Viatel, Australia's videotex service, and three private companies followed suit.

New personal computer software arrived on the Australian market at a rate of 100 products per month during 1984.

Laurel Allen

ComputerPhone

While Telecom has created a stir by entering the PC arena, its ComputerPhone could be the busy executive's dream come true. It allows several applications to run simultaneously, talks to telephone callers and features microdrives — to name just a few of its impressive capabilities. David Tebbutt presents this exclusive test.

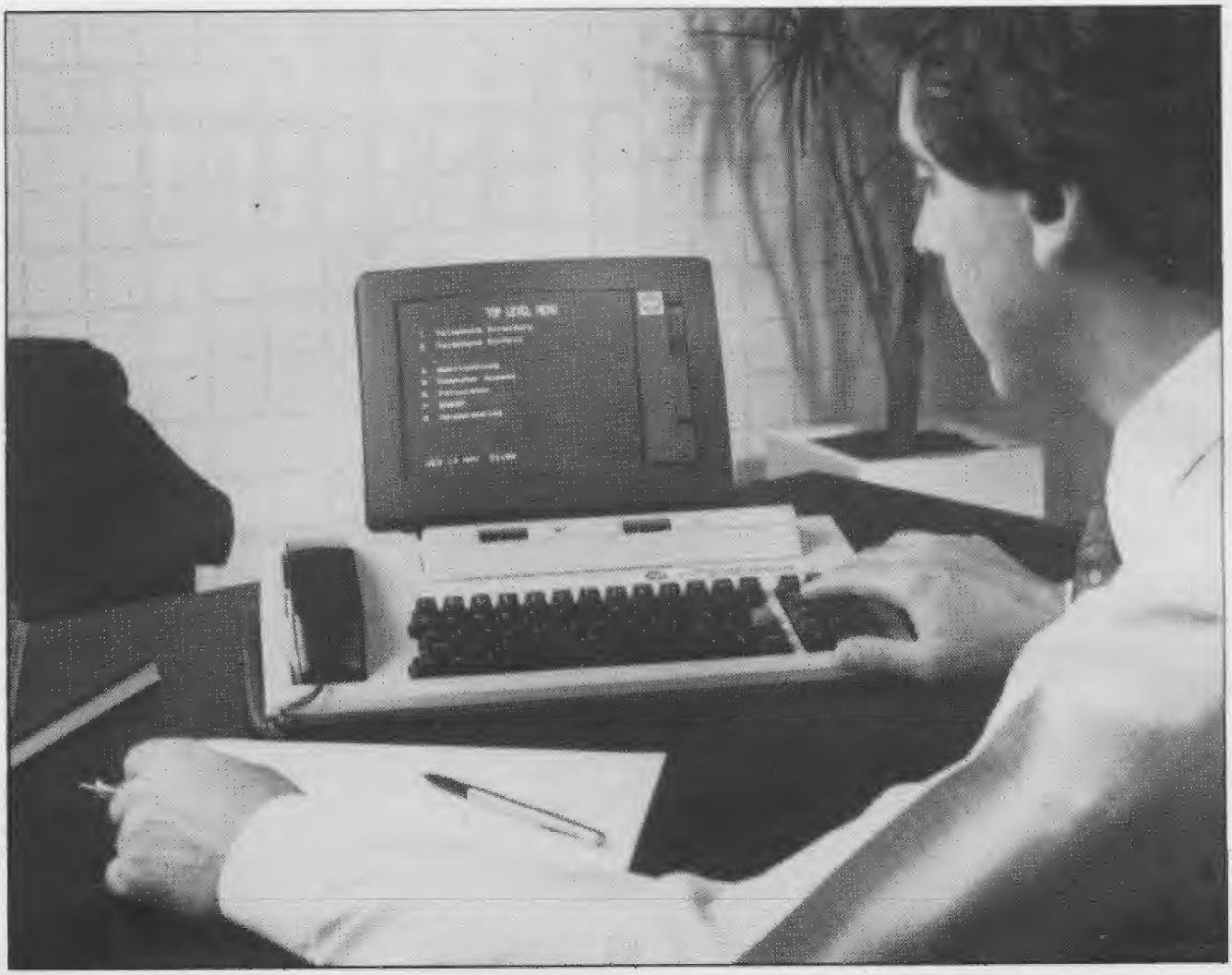
What does your average busy professional do all day long? I'll tell you. He dives from task to task, taking phone calls, dashing off letters or memos, calling people and generally looking totally disorganised.

In fact, such a person is well in control and is capable of responding rapidly to changing circumstances and altering priorities accordingly. Unfortunately, most computers can't keep up with such a person. They prefer to grab you for an application and hold you there until a job is finished. Integrated programs like Symphony or Framework help considerably and the more recent development of background tasks (calculator, calendar, notebook, and so on) will bring computers much closer to an executive's needs.

Imagine a computer that lets you run several different applications 'at the same time', takes up less space on your desk than the average personal computer, replaces your telephone for both voice and data calls without interfering

Side view: the monitor is adjustable and fits snugly to the machine

Two Sinclair chips sit on the main PCB with the processor, ROMs and speech synthesiser chip on a smaller board



The standard qwerty keyboard incorporates a pair of microdrives and a telephone handset

with other applications, and chats to your callers when you're out. Interested? I certainly was when Telecom's ComputerPhone arrived.

Imagine a computer that lets you run several different applications 'at the same time', takes up less space on your desk than the average personal computer, replaces your telephone for both voice and data calls without interfering with other applications, and chats to your callers when you're out.

The amazing thing about this project is that it's been kept so quiet despite numerous mentions a couple of years ago. Here's a quote from a 1982 Sinclair press release: "In December 1981, ICL announced that it was to develop with Sinclair Research an ultra low-cost integrated terminal/digital telephone workstation employing Sinclair's flat tube technology and Sinclair Basic. At the time it was christened the "One Per Desk IT Work Station"." The Basic and the name (OPD = One Per Desk) survived in the UK where the product is also being marketed (but by ICL), but the flat screen was discarded somewhere along the way. The microdrives used for backing up the memory are a visible reminder of Sinclair's involvement, but the predominant influence is clearly ICL's.

Hardware

The ComputerPhone comprises two units — a monitor and a keyboard unit incorporating a pair of microdrives and a telephone handset. To avoid the need for a cooling fan and to allow continuous operation for up to five years, ICL has tucked the power supply away in the back of the monitor unit. A single lead connects the units together, and this carries both power and control signals. A second socket at the back of the keyboard unit allows the attachment of an RS 432 printer.

The colour scheme is chocolate and cream with burgundy telephone control keys and a lime green ENTER key. This is a good idea because the ENTER key is quite puny: it's been made the same size as the letter keys to help make room for special control keys. Six LED windows indicate whether power and the screen are on, which telephone lines are active and which microdrives are in use.

The machine has no power switch but, in view of its continuous use, has a screen on/off switch to preserve the tube's life. In addition the screen will blank after five minutes of inactivity in order to protect the phosphor coating. A loudspeaker permits call monitoring without lifting the handset. The handset

ONLY THE SUNOL HARD DISK GETS IBM PC AND APPLE MACINTOSH WORKING TOGETHER!

New SUNOL technology brings concensus to business Microcomputers in Australia ...now your IBM PC and PC-Compatible can talk to your Macintosh, Lisa, Apple //e, Compaq, Kaypro, Apricot, Sirius and ALL popular business micros!

Incompatibility has posed insurmountable barriers to computer communications. You recognise the symptoms. Too many dialects. Incompatible hardware. Immense loss of commercial opportunity.

The Sunol Winchester Hard Disk System changes all that immediately – and permanently!

Now, great minds can think alike – or at least share the same thoughts! Sunol's data access is 10 times faster than a floppy – at 7.5 megabits per second transfer rate. (Our rivals can only manage 5 megabits!)

Choose your SUN★DISK from 10 to 368 megabytes (formatted) for all the right reasons:

SUNOL's SUN★MAC allows operation of up to 31 Macintoshs by using Apple's very own Local Area Network (LAN).

SUNOL's SUN★MAC can then be connected into SUN★NET, giving you the best of both worlds – files created on Macintosh can be used on IBM PC, PC-Compatibles, and vice versa!

SUNOL's SUN★NET allows up to 64 micro-computers at a time (most popular brands) – with as many as 7 different operating Systems – to be networked on the same SUN★DISK.

SUNOL's UNIQUE SUN★SAVE TAPE BACKUP SYSTEM can be also accessed at random – in floppy disk style! No-one else can offer this facility!

SUNOL's CUSTOMER PROTECTION WARRANTY covers Hard Disk Drives for 6 months (Tape Drives for 90 days).

SUNOL WINCHESTER HARD DISK SYSTEM allows ALL popular micros to talk business! So, talk with our Dealer about installing SUNOL – TODAY!

AUSTOR
MICROSYSTEMS

SUNOL AUSTRALIAN DISTRIBUTORS
Level 1, 3 Bruce Street, Crows Nest NSW 2065.
Telephone: (02) 922 2022

SUNOL Australia-wide Dealer Network Members:
SYDNEY: INTELLIGENCE (AUST) 699 3877; **THE LOGIC SHOP:** 439 1072; **NEWCASTLE:** COMPUTER CELLAR (049) 675 700; **MELBOURNE:** INTELLIGENCE (AUST) 690 6600; **BRISBANE:** COMPSOFT 839 0066, CLEVELAND COMPUTER ORCHARD 286 3777; **PERTH:** NATIONAL COMPUTER SERVICES 322 1677

SUNOL National Service Agents:
COMPUTER MAINTENANCE OF AUSTRALIA: SYDNEY: (02) 406 4744; **MELBOURNE:** (03) 338 7833; **BRISBANE:** (07) 371 1911; **FYSHWICK (ACT):** (062) 80 5359; **ADELAIDE:** (08) 49 9211; **PERTH:** (09) 458 9752; **HOBART:** (002) 344 522; **DARWIN:** (089) 84 4611; **NEWCASTLE:** (049) 67 6299; **TAMWORTH:** (067) 66 1599. Also distributed and serviced in NSW & Vic by Intelligence (Aust).

THE ADVERTISING AGENCY. AMS.2

must be used if you wish to speak — there's no microphone in the machine itself.

The keyboard, or control unit, comprises three modules — the main unit, the telephony module and the ROM module. The main unit contains the processor, memory, operating system ROMs, most of the control circuitry, the microdrives, the keyboard and a numeric keypad. The telephony module plugs into the rear left of the main unit, and has two telephone leads and the handset trailing out of it.

The ROM module slides into the rear right of the ComputerPhone and contains two sockets into which plugs applications software: for example, the messaging software. The ROM pack also contains Psion's Xchange suite of programs which are tucked away inside the pack on five ROMs of its own. When faster one-megabit ROMs are available, the number of ROMs needed for Xchange will be reduced and the ROM pack will allow the addition of up to four additional plug-in applications. Plug-in modules can be 8-, 16- or 32k each.

This is the easiest machine I've ever taken to pieces. The only screw was in the telephony module and I'm not entirely clear what it was doing there anyway. The top of the main unit is held to the base by nine concealed plastic clips; a slot allows you to insert a screwdriver and lever off each clip. It takes seconds and is designed for rapid replacement of damaged or faulty components.

The connections between the upper and lower parts of the assembly are the 14-pin microdrive connector, the handset switch leads and the loudspeaker leads. The keyboard lies over the front part of an oddly-shaped PCB (at least, I'm calling it the main one because it's the largest). In fact, the processor, four ICL system software ROMs (32k each) and the TI TMS5220 speech synthesiser are on a separate smaller board 'piggy-backed' onto the first. Two Sinclair-designed chips sit on the main board (sounds like a business machine, doesn't it?) and, of course, the microdrive ULAs are Sinclair's too. The three Sinclair chips and the Motorola 68008 processor are the same as those used in the QL. The main board contains 128k of main memory on 16 chips. An additional 2k of static RAM contains essential system parameter information, and is backed by a lithium battery designed to last at least five years. A further ROM contains the vocabulary for the speech synthesiser. Apart from such things as a volume control and a piezo electric speaker, that just about covers the main ingredients.

The upper part of the assembly contains the loudspeaker, the handset on/off switch and the microdrives mounted on their own separate assembly. I must confess that I approached the microdrives with some trepidation, but they worked reliably.

The keys are well laid out and of normal pitch. The keytops are dished and have a slightly bumpy surface which makes them pleasant to touch. The technology underlying the keyboard is not a million miles from its much-hated rubber membrane relative: each key rests on a rubberised plastic 'bubble'. The bubble is securely trapped by a plastic surround attached to the keyboard PCB. This bubble doubles as a spring and, presumably, as a connector. The keys automatically repeat after a short pause and a hefty 128k Basic keyboard buffer is provided. This keyboard is designed for low to medium use over the product's lifetime.

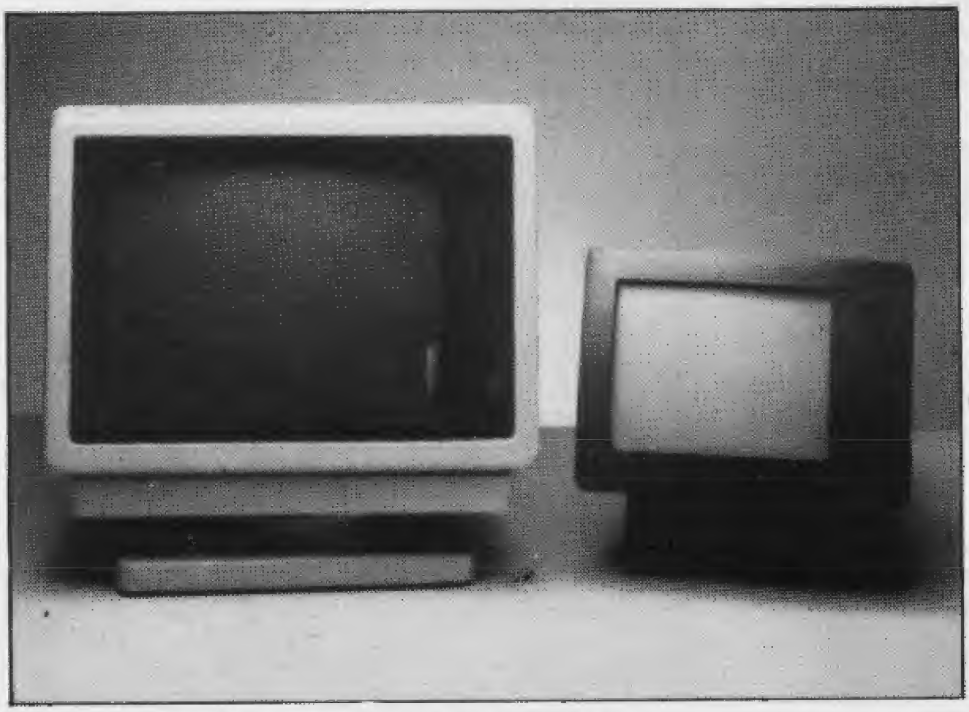
The qwerty keyboard is standard but there are a few differences. For example, the numerics on the top row each have three characters inscribed on the key top; the third is accessed by holding down the ALT key while pressing the numeric. INS and DEL are provided on a single key: they open a gap in the current line and delete the character preceding the cursor respectively. If you press CTRL with this key, it deletes characters to the right of the cursor and closes up the gap. TAB and BACK TAB are provided on the same key and are used to move between 'boxes' on data entry screens. The cursor keys are to either side of the space bar.

Now for some new keys: START, RESUME and REVIEW are specific to the ComputerPhone. Because it lets you run several tasks at the same time, these keys, in conjunction with ICL's firmware, allow you to get out of something (START), get back into whatever you left last if it's still there (RESUME), and find out what tasks are going on at the same time (REVIEW). This last function gives a menu of all active tasks and you can elect to go into any one.

Over on the right is the numeric keypad which comprises fifteen keys and works in conjunction with SHIFT and ALT. In this context ALT turns the numeric keys into function keys and, as a reminder of this, has a lower case 'f' inscribed on it. I have always thought that separate function key pads are an irritation, just something else to learn, but ICL's answer is so simple I'm astonished that I've not come across it before.

The numbers are laid out in the same way as a touch-tone telephone: that is, with 1 2 3 at the top. Since this computer is so closely linked with the telephone system, ICL has made the right decision. Two keys on either side of the zero contain videotext special characters, asterisk and hash; the shift positions of these keys contain ESC and PRINT respectively. The first we know, the second performs a screendump to your printer.

The remaining keys all have some function connected with the telephone system. Here's the top row: LIST shows your important phone numbers; RECALL has the same effect as RECALL fitted to some telephones; AUTO lets



Choice of monitors: a 14in colour or a 9in monochrome

Privately, even the experts will tell you that dBASE is the number 1 database management system in the world.* Now with dBASE III, you can get even more out of your IBM PC or close compatible. It's fast, it's easy.

It's also very clever. dBASE III copes equally with the needs of the novice and the demands of the expert. If you're unsure of a command, HELP will tell you what to ask for. If you don't know what command comes next — ask the database ASSISTANT.
And experts can talk in code, just the way they're used to.

dBASE is used to handle your information. Doctors and lawyers. Accountants and salespeople. Big business and small. The routine and the unexpected.

You've never seen anything like it. dBASE III can handle over a billion records per file, and you can have up to ten files open. When you have two related files, information in one can be accessed based upon data in the other. dBASE III now handles procedures, parameter passing and automatic variables. dBASE III isn't just fast. It's ultra-fast sorting.

What about dBASE II? If you have an 8-bit computer running CP/M, then dBASE II is still No.1.

Expert or novice?

There's no hidden extras with dBASE III. You get a complete manual, tutorial and all the software. And top Australian support. Contact your local dealer, now, for a demonstration. Or use the coupon below to obtain more information from the Master Distributors, Arcom Pacific.

arcompacific
■master distributor■

Please send me details about dBASE III ☐
and other ARCOM PACIFIC products ☐

My name is .....

Company name .....

Address .....

..... Postcode .....

The micro I currently use is .....

and software .....

Send to ARCOM PACIFIC Freepost 2 (no stamp required)
P.O. Box 13, Clayfield Qld. 4011

* Over a quarter of a million copies of dBASE are in use throughout the world, more than any other business data base product

† dBASE II and dBASE III are registered trademarks of Ashton-Tate. IBM is the registered trademark of International Business Machines

apricot

The 4th generation personal computer

A computer that, for the first time, works with you rather than just for you. Hardware and Software co-ordinating perfectly, Apricot arrives complete and ready to work.

The MicroScreen™ on the keyboard, unique to Apricot, performs a variety of practical functions—as a calculator, calendar, time display, and as a window on the screen. Most significantly the MicroScreen™ prompts and assists the user by presenting simple options whilst running applications.

As you'd expect with a 4th generation system, Apricot offers true 16-bit processing, multi-processor architecture and 256K RAM as standard.

With 16-bit business software and compatibility with the best selling Sirius 1 and IBM PC, Apricot already has the largest available software library.

Incorporating the very latest advances in computer technology, Apricot uses 3½" pocket-size diskettes. Secure and compact, yet offering increased storage capacity.

Apricot includes over $1,000 of software—SuperCalc spreadsheet, business and communications software—to ensure that your system is immediately effective.

And because executives are not office bound, Apricot offers portability, a further feature aimed at improving efficiency.

Powerful sleek and sophisticated—and all at an amazing 4th generation price.

BARSON computers

Please send me the latest information on Apricot—the 4th generation personal computer.

Name _____

Address _____

_____

Post Code _____

Phone Number _____

BARSON COMPUTERS
335 Johnston St. Abbotsford, Vic 3067
or call 03-419 3033

"Once we've demonstrated the APC III working for you, you'll want to keep it. The price is just one reason why."

– Natwick Management

With twice the speed and capacity of the IBM PC, the new NEC APC can handle all the work you can throw at it. And at $3,565, it's half the price of the IBM.

Plus:

It'll get the work out faster
The APC III runs at around double the speed of most computers –8MHz. The processor is a true 16 bit (8086). So the job gets done faster.

More storage – more power
Ultra high speed 5¼ disks store 640,000 bytes each. An inexpensive hard disc adds 10 megabytes –enough for very powerful business applications.

Easy to use
The familiar IBM Selectric keyboard layout plus numeric keypad will put you and your staff at ease.

NEC can service and support you
NEC are one of the few companies with full service throughout Australia. They have the hardware (and software) expertise to support you.

There are no hidden extras
Serial and parallel interfaces are built in. 128K of memory is standard.

What does it all cost?

Less than you might think. Here are leasing rates on two packages.

System 1.

2 x 640K floppy discs
Monitor
180cps dot matrix
or
20cps daisy wheel printer
Attache business pack 1
Software, including accounts receivable, invoicing, sales analysis, inventory.
WordStar wordprocessing

$197.18/month*

System 2

1 x 640K Floppy disc
1 x 10MB Hard Disc
Monitor
180cps Dot Matrix
or
20 cps Daisy Wheel printer
Attache business pack 1
Software, including accounts receivable, invoicing, sales analysis, inventory.
WordStar professional pack wordprocessing

$247.03/month*

*(Based on leasing over 4 years with 10% residual)

We come to You
Call us. Evaluate the APC in *your* home or office, solving *your* problems. We back every sale with training and expert advice.

Natwick Management

Suite 1, 25 Burns Bay Road,
Lane Cove NSW
Phone (02) 428 1666

you switch a data call from the handset to the modem; SPKR initiates a 'hands off' call or transfers a call to the loudspeaker; LAST displays the last six numbers dialled and redials your choice; and REDIAL redials the last number dialled. Of the remaining seven, HOLD-S holds a call and transfers you to the other line; SELECT switches your preferred line; END ends a call and starts a new one, or connects you to a call on the other line; DIAL connects/disconnects the numeric pad from the telephone (presumably so you can use it in a program); HOLD holds a call; CAPS (what's that doing *here?)* locks the keyboard in upper case; and TIMING starts timing a call or lets you enter a charge band code.

The amazing thing about this project is that it's been kept so quiet despite numerous mentions a couple of years ago.

The screen has a maximum resolution of 256 x 512 pixels, which gives a choice of four colours (or shades of grey) — black, white, green and red. Using a 256 x 256 resolution, the number of colours is doubled to eight and you can make the pixels flash too. In normal use the screen is laid out as 26 lines each of 80 characters (alternatively, each line can contain 40 characters). The top 24 lines form the main display area and the bottom two are referred to as the 'Noticeboard', where the system status messages appear. Since many things may be happening at the same time, these last two lines are essential.

The machine I tested had the standard 9in monochrome monitor, but a 14in colour monitor is also available. The monitor has a two-position pair of legs at the front. One position has the monitor lying almost flat on the desk but it's all still visible behind the sloping main unit; the other position raises the monitor so that it may be pulled close to the main unit where it fits snugly just behind the microdrives. This latter position also tilts the screen backwards and makes it more natural to use. Apart from the screen protection facilities (on/off and auto-blanking after five minutes), the monitor has a slider control for brightness and two LEDs — one to show that the tube is still powered, the other to show that the mains power is connected.

The telephone module is controlled by a Frequency Shift Key (FSK) modem and can handle 1200/75 baud for Viewdata connections, 1200/1200 half-duplex and 300 baud full duplex. It can also handle two telephone lines at once, and with only one modem and one handset, these will normally be a data line and a speech line. However, it's possible to put one voice call on hold while dealing with another. The board is designed for analogue communication, but a digital board is under development to be ready when digital communication becomes more established. Auto-dialling and auto-answering facilities are also provided.

The speech synthesiser and its associated vocabulary is used to construct messages which can then be broadcast through the telephony module when set in auto-answer voice mode. Auto-answer data mode allows the reception and storage of data without user intervention.

System software

The Sinclair QL has an operating system called QDOS which is intimately related to QL Basic. In fact, I think they may even occupy the same ROM on that machine. ICL has written its own operating system software and accordingly has had to prise the Sinclair Basic away from QDOS prior to building it into the ComputerPhone.

ICL is aware that a large amount of third party software will be written for the QL, and will therefore be trying to make the two languages as compatible as possible. ICL will also want to make its own operating system resources available to Basic programmers, so I expect the Basic to be completely compatible with QL Basic.

The ComputerPhone user will be very taken with the 'operating system' provided with the machine. To call the ICL software an operating system is rather insulting. ICL calls it the Base Functional Software as it not only controls the essential functions of the machine, but also provides services which the user can invoke in order to access the various applications available. Briefly, the elements of this system are as follows: Kernel, Director, telephone handler, telephone directories, calculator, screen image printing and field editor.

The Kernel is what we normally call an operating system: it manages the nuts and bolts and provides a logical map of the hardware devices. Input, output, memory allocation, device control and interrupt handling are the main tasks of the Kernel; and everything is, of course, invisible to the user.

The Director is a higher-level piece of software which comprises two elements — the applications handler and the telephone handler. The Director schedules activities so that they don't trip over each other in their bids for machine resources. Guidelines exist for software authors and, providing they obey the rules, the Director and the Kernel will make sure that no contention problems arise. The Director takes care of those strange keys I mentioned earlier, START, RESUME and REVIEW, and is always in control of what application is where, what resources it's using, and what state it was in when it was last active.

The telephone handler part of Director keeps track of the calls which have been requested by the various applications, the status of each line and the management of voice and data calls through those lines. Auto-dialling, line switching and connection of the speech synthesiser are handled by this part of the software, as is the reporting of the telephone system status to the Noticeboard at the foot of the screen.

ComputerPhone contains two telephone directories — one for computer services and the other for voice calls. The directories can be searched by keyword or partword, browsed, used to automatically dial a number and saved to microdrive. The user can create and amend directory entries, and load and merge directories from microdrive. All these facilities are directly available to the user from a series of menus.

A simple calculator is provided which handles up to 16 digits (plus decimal point and sign). Calculations are to eight decimal places and the normal +,–,*,/,= and % facilities are provided. In addition, a number of memory commands are included but, frankly, the calculator is nothing to write home about. It's on a par with a credit card calculator, with the additional benefit that you can see the details of earlier calculation scrolling up the screen as if they were on paper.

The screen image printer literally freezes the screen when the button is pressed and dumps the image to the printer, and is obviously useful if you've encountered an interesting videotext or electronic mail page.

The field editor provides cursor positioning and text editing controls, giving the user a consistent approach to data entry and amendment tasks.

All the foregoing functions are built-in to enable applications programmers to provide a consistent user image in their programs.

For the ordinary user, all the system's facilities and supplied programs are presented through a series of menus. Although you may lose track of yourself

Memorex reliability, the inside story.

Vast experience, renowned reliability and technological supremacy of the world's leading computer media manufacturer contribute to the story inside every pack of Memorex flexible discs.

The extensive research, exhaustive testing and stringent quality control procedures which surround every Memorex product ensure that Memorex users have the most reliable flexible disc on the market. Every track of every disc is 100% error free tested.

Use Memorex flexible discs and you'll discover that our "inside story" is not just another "tall story".

Special soft polyester liner constantly cleans disc during use.

Unique burnishing process provides ultra smooth surface for better head to disc contact and reduced head wear.

The Memorex name is your assurance of the ultimate in quality and reliability.

Coating uses the latest oxide technology, optimising signal output and recording accuracy.

Precision applied plastic hub ring protects disc edge from damage.

The carefully applied Memorex serial number allows identification of each disc.

Extra stiff glue bonded jacket ensures greater reliability, lower disc torque and easy loading.

MEMOREX Pty Ltd
Available from: Sydney (02) 908-2211
Melbourne (03) 267-2955
Or a Distributor near you

MEMOREX

A Burroughs Company

from time to time, you can always get back to the main menu by pressing the panic button — the START key. The main menu comprises the following options: Telephone Directory, Telephone Control, Messaging, Applications, Computer Access, Calculator, Basic, and Housekeeping.

The Telephone Directory option conceals a lower menu which allows you to create and amend directory entries, save and load them via microdrives, search for an entry by keyword or part-word, display the current entry, and make automatic calls. You can store two numbers for each person — one data, the other voice. Extension numbers may follow the telephone number for display onscreen while the call is being put through. The only trouble is that when you lift the handset to ask for the extension; you need to use your own snort-term memory.

The Telephone Control option allows you to examine the status of your telephone lines (free, ringing, answering, and so on) and the last number called. The fun starts when you want to set the ComputerPhone to automatically answer voice calls with its built-in speech synthesiser.

A selection of some two hundred words is offered and to create a message you simply type it using these words. If a word is unrecognisable to ComputerPhone it will highlight the wrong word so that you can change it. Endings such as -s, -ing and -ed may be appended to words and letters, numbers and dates (1st to 31st) may be included. A sentence like: 'I am sorry, I am out. Please call my secretary on extension "328". Thank you.' is quite feasible. If you're the imaginative sort you could cook up something like: 'I have gone for a we-we. Back soon.' Full stops, spaces and commas provide pauses of varying lengths. It works, it's fun and you can't be in any doubt that you're being answered by a computer.

You can set a time window for auto-answer and automatically switch to an alternative message outside that window; a repertoire of up to sixteen messages may be stored in the ComputerPhone. If you want the phone to ring for 14 seconds before your Dalek answers, then that can be arranged too; this gives people a chance to hang up when they realise you're not there. Other features of Telephone Control allow you to time calls and let ComputerPhone work out approximate call charges.

The plug-in ROM capsule covering Messaging is a kind of electronic mail facility which lets you create memos, messages or whatever in a 'notebook' on your ComputerPhone. You pop it into the electronic 'out tray' where it waits to be transmitted to its destination. Transmissions take place without your intervention and, when you arrive in the morning, you may well find a stack of messages in your electronic 'in tray' which can be transferred to your notebook, printed out or simply destroyed.

The Applications option clearly depends on what you have plugged into your machine. On the review machine it offered a cartridge menu which told me which programs were available from the microdrive, statistics relating to the microdrive's performance and access to Xchange, the suite of applications programs.

Computer Access lets you maintain a file of computer phone numbers and access details in a similar way to the voice Telephone Directory mentioned earlier. It allows automatic or manual connection using Viewdata or Teletype conventions. Pages of data may be stored for later printing and protocols can be tucked away on its Profile Store. I tried one network but was denied access — someone may have changed the password. The auto-dialling, the connection and the sign on worked perfectly though.

I had more success with a videotext service and suffered the usual experience of profound disappointment with what was there. I saved pages and displayed them after I had disconnected, and it pleased me to think that I was cutting down on my phone bills by using the facilities in this way.

Finally, the Housekeeping option allows you to check the battery charge, set the time and date, save and load important bits of store and mess around with the microdrives. Format, copy, rename, display and delete are among the utilities provided.

Technical specifications

Processor:	68008, 7.5MHz
ROM:	128k integral 208k ROM pack
RAM:	128k dynamic 2k static (lithium battery-backed)
Mass storage:	Two microdrives, minimum 95k each
Keyboard:	73 keys, qwerty plus telephone-style numeric pad
Monitor:	9in monochrome
Size:	Control unit, 95mm x 440mm x 250mm Monitor 250mm x 280mm x 280mm
Weight:	Control unit, 3kg Monitor, 4.75kg
I/O:	Nine-way RS432 serial connector
Modem:	1200/1200 half-duplex, 75/1200 and 300/300 full duplex
DOS:	Proprietary
Bundled software:	Telephone directories, control, communications, utilities, calculator, Basic, Xchange
Peripherals:	Printer, 14in colour monitor

Applications software

Included with the ComputerPhone is the Xchange suite of programs. This comprises the four most popular applications — spreadsheet, business graphics, word processor and database. Called Abacus, Easel, Quill and Archive respectively, they are similar to the versions offered on the QL and the popular MS-DOS machines in the UK.

The programs offer a perfectly adequate set of facilities, and any minor niggles (especially the need to type Archive commands in full) are overcome by their low price. Because the Xchange applications are held in ROM and treat RAM as if it were a microdrive, the loading of programs and exchange of information is impressively fast. You can, of course, specify the microdrives for data storage when things do slow down; the trick is to make your telephone calls while the drives are busy. You can get into other activities but, sooner or later, they suspend the microdrive activity.

ICL is looking for other software but, at the time of writing, it either hadn't found what it was looking for or was keeping quiet about its plans. As I mentioned earlier, the company is aiming for compatibility with software offerings destined for the Sinclair QL.

Documentation

The ComputerPhone is supplied with the following manuals: *Installation; Hand-*

In perspective

A single glance at the ComputerPhone betrays its pedigree. The Sinclair microdrives peer at you over the top of the keyboard. Inside you'll find three Sinclair-designed chips and the Basic is adapted from Sinclair SuperBasic. Having said all that, the rest of the design is definitely ICL's. The system software has been written by ICL to handle a wide range of tasks concurrently — exactly what the busy professional needs; access to these facilities is through a series of simple menus.

With its built-in voice and data telephony system, the ComputerPhone is clearly distanced from the run-of-the-mill desktop computers. It has been said that the few square inches on the top of the executive's desk are the most valuable piece of real estate in the world. The race is on for that space and Telecom is in with a very good chance of leading in the first lap. At $2,950 this product represents good value. Looking around the market-place it is difficult to decide which machines to compare it with; because there's nothing like it the choice is limited. Most people will need two telephones, a modem, a personal computer and a pile of software packages to match the ComputerPhone's facilities.

An IBM PC plus RS232 board, modem and integrated packages such as 1-2-3 or Symphony would certainly be more than a match for it. But at what cost? The microdrives put a limit on data storage, but many users wouldn't notice this.

There isn't anything available in our market which compares with the ComputerPhone. You're on your own with this one. Go out and put all these facilities around any personal computer and you'll probably find that when you price it you'll wonder why you bothered.

While the question of whether a semi-government body such as Telecom should be permitted to compete in the market-place is not strictly part of a Benchtest, some comment is called for:

When questioned at its launch about why Telecom was selling such a product, a spokesman said that the ComputerPhone was servicing a part of the market not being covered by existing products, such as telephones and PABX systems and that it was inevitable that there would be overlap with the PC market.

To confine ourselves to Telecom's argument, it is, by implication, describing the ComputerPhone more as a phone/communications device than a computer — otherwise there would be no spokesman stating the inevitability of 'overlap' with the PC market; it would not be a case of unintentional overlap but one of direct competition. A description of the machine is obviously open to subjective opinion and it is our's that the ComputerPhone's pedigree is clearly the personal computer.

Just as the law must be seen to be upheld, so it would have been wise for Telecom to encourage such a product in the Australian market-place but leave the marketing to someone else (and why not ICL?). As it stands now, Telecom has left itself open in the long- and short-term to claims of vested interests in a whole spectrum of its activities.

book; Basic; Messaging; and *Welcome Package.*

The manuals are well laid out and well written, although I did feel the need for a road map from time to time. The problem lies less in the manuals than in the complexity of the subject being tackled. This is a very sophisticated machine and ICL has tried very hard (and very successfully) to hide this from the user. Because the manuals have to cover the subject thoroughly there's a danger of getting bogged down, so my advice is to read as little as possible and use the machine as much as you can. As you run into gaps and apparent inconsistencies, that's the time to study the manuals.

The *Installation* manual is approximately 25 pages which tell you clearly what to do to get your ComputerPhone going. Read it — you must. It's a model of clarity and about 50 per cent pictorial.

The *Welcome Package* runs you through a series of 'typical' activities using both a microdrive cartridge and the *Welcome* book. The cartridge is the easiest way to get a feel for the software if you'd like a little theoretical learning before properly using the machine. The accompanying manual is thorough but makes machine operation look more complicated than it actually is.

The *Handbook* tells you everything you're likely to need to know about the ComputerPhone, but is a book dipped into rather than read straight through. It's clearly written but once or twice I found it guilty of 'forward referencing' — it mentions things before it's explained what they are.

The *Basic* manual is utterly comprehensive and can be used equally well by a novice or an expert.

Prices

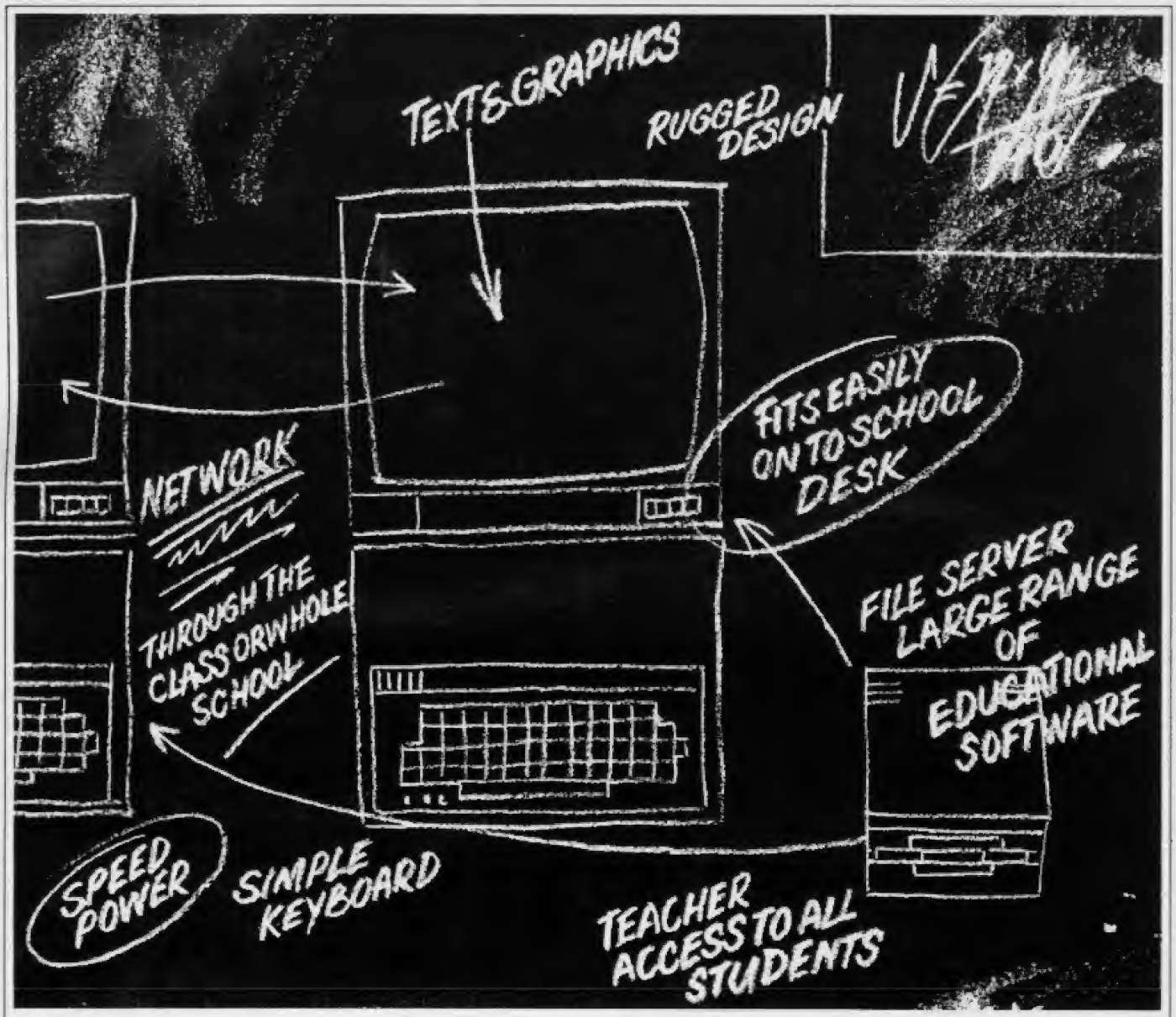
Telecom is offering three 'packages'. The first includes the ComputerPhone with the mono screen, Xchange and messaging software and a pack of ten microdrive cartridges; it will retail for $2,950 including sales tax. The second package is the same as the first but includes the four colour printer and will sell for $3,600. The third offering includes the printer and the colour monitor and will set you back $4,400.

The ComputerPhone is scheduled for release in February and will come with a two year warranty.

Conclusion

The ComputerPhone is an excellent concept. It grabs a corner of the desk and, with the Xchange software, takes care of most of the professional's data processing and telephone needs. By allowing several tasks to be operational at once, the ComputerPhone comes very close to matching a user's rather erratic way of working.

The price is excellent and I suspect that, for a few months at least, Telecom will have the field to itself.



The only computer that was designed in a classroom, not a factory.

If you want to find out how suitable a computer is for your school, ask where it was designed.

One brand, you'll find, was designed in a garage.

Most others came into being in factories.

Only one computer, the BBC micro, was actually created in a classroom.

The classroom, by the way, was at Cambridge University.

And leading the design team were those masters of educational television, the British Broadcasting Corporation.

Consequently, the BBC is one computer that adapts perfectly to the classroom.

Because it is one computer that doesn't have to adapt.

A whole bank of them can be linked together (up to 254 in fact) with the teacher (master station) in full command of the class.

The BBC computer is so simple to use that new students can make immediate progress.

At the same time, for advanced students, the BBC expands to encompass the most complex and esoteric realms of computer wizardry.

Understandably, the BBC is chosen by over 80% of British Schools and is already enrolled in over 1,000 Australian Schools.

In fact, it is now recommended by seven Education Departments in Australia.

After all, that's precisely what it was designed for.

The BBC school computer.

For more information on the BBC microcomputer and the new compact version, the Electron, send this coupon to: Barson Computers Pty. Ltd. 335 Johnston St., Abbotsford, Victoria 3067, or 7 West St., North Sydney 2060. Or phone Barson Melbourne on (03) 419 3033 or Sydney (02) 957 2588.

Name:

School:

Address:

Postcode:

BARSON COMPUTERS

YANKEE DOODLES

Our US reporter has encouraging news for word processing users, and announces tough competition in the disk market.

Taking the stage

December 1984 saw the worldwide debut of WordStar 2000, a complete rewrite of the old WordStar. The new features look like a wish list from every word processing user in the world: a three-window screen, footnoting, multiple-line headers and footers, proportional spacing, a glossary key, sorting, spelling checking, an UNDO command, built-in calculator functions, and much more. Micropro claims that the package will be easy to use — something that WordStar has never been — and that first-time users will be up and running 'in a few hours'.

WordStar 2000 will sell for $495, or half that ($250) if you upgrade from the old WordStar. An advanced version, WordStar 2000 Plus with menu-driven telecommunications, mailing list database and an indexing feature, will sell for $595 ($350 with a trade-in). The initial version runs only on the IBM PC and 100 per cent compatibles, but there's no 8-bit machines: Micropro doesn't see that as a major future market.

This delights the people at Newstar Software (formed by former Micropro people). Newstar's improvement on WordStar, NewWord (functionally equivalent to WordStar 3.3 with MailMerge plus a few additional features) has been struggling for recognition for over a year. NewWord costs $249, half the price of WordStar, and is available for both 8- and 16-bit machines.

The floppies are retaliating!

Three leaders in audio compact disk technology have invaded the computer field, but floppy disks are retaliating.

Denon, Philips and 3M have announced the development of a CD-based optical ROM system for computers. A single 4¾in CD ROM has a capacity of over 550Mbytes, about the equivalent of 500 double-density floppy disks. In addition to offering efficient storage, this enormous capacity also provides the opportunity to store high resolution graphics along with standard ASCII data.

Moreover, the ruggedness and reliability of the optical CD ROM disk and its drive mechanism is said to far exceed that of conventional magnetic media — floppy disk or hard disk.

Meanwhile, Compusonics of Denver has invented a digital machine that records music on ordinary magnetic floppy disks and hard disks. The professional model ($35,000) records up to one hour on a hard disk, but the company plans to launch a $1200 home unit that can record up to 45 minutes on a floppy disk. McIntosh Laboratories, a maker of high-end audio gear, also plans to make a floppy disk recorder using Compusonics' technology.

Random bits

IBM is overwhelmed with orders for the AT. Dealers have been put on allocation and the lead time to get a system is now about three months . . . IBM has also bought a bunch of Japanese MSX computers, peripherals and software from Quest Publishing, a group of former SpectraVideo employees — I wonder why? . . . An apologetic letter from vice president Steve Ballmer of Microsoft discloses a further delay in the shipment of Microsoft Windows from November 1984 to June 1985. Apparently the designers are having problems with speed, graphics capabilities and reliability . . . Microsoft isn't alone. Gordon Mustain of Rising Star announced yet another delay in the release of Valdocs 2.0 for the Epson QX-10 to increase the speed of the word processing module and add additional features . . .

Film giant Eastman Kodak has entered the floppy disk business. Initially it plans to resell disks made by Dysan and several other domestic and foreign producers, prior to producing its own media in Guadalajara, Mexico . . . Hotels are becoming more responsive to the needs of modern business travellers. For example, the Hyatt Regency in Chicago rents an IBM PC (and software) for $6 per hour. In Minneapolis, the Omni Northstar rents an IBM PC and printer for $10 per hour; Lotus Symphony costs an additional $10 . . . Having lost $3 million in the first nine months of 1984, Management Science America (MSA) has put Peachtree Software up for sale. So far, no takers. Peachtree recently bought two educational software publishers, Edu-Ware and Design Ware but killed off the Edu-Ware label. Now, Design Ware plans to re-introduce the label . . . Deserting the ship? Ronald Mickwee, chairman of Eagle Computer, recently sold his entire stock holdings of 128,500 shares . . . Doubleday paid one of the biggest advances ever for a computer book, $1.3 million, to Stewart Brand for the Whole Earth Software Catalog. To make money on the deal, Stewart expects Doubleday will have to sell more than 500,000 copies. I'd be surprised if it touches 100,000 . . . Rumours: VisiCorp will merge with a new Sunnyvale-based company, Palladin, and founders Dan Fylstra and Peter Jennings will not have a role in the new company . . . Apple will discontinue the Lisa line in 1985 and concentrate on the larger Macs plus a new 16-bit Apple IIx.

Sinking or swimming?

Awash in a flood of red ink, Otrona Advanced Systems terminated all 175 remaining employees in late October 1984. About the Otrona 2001 transportable IBM PC compatible, president James Lindner said: 'We could sell it, but were unable to build it at a profit.' The managers planned to liquidate the company rather than file for reorganisation under Chapter 11.

Franklin Computer, which had been operating under the protection of Chapter 11, has been unable to find a buyer or merger partner and will liquidate its assets and cease operations.

Stearns Computer Systems in Minneapolis, maker of an 8086-based desktop system, announced a layoff of 14 employees last October. The firm had previously laid off 30 workers in the summer of 1984. On the bright side, the company announced it had become profitable as of September 1984.

Knoware Inc, founded by two MIT professors, marketed an interesting software package that purported to teach executives how to climb the corporate ladder by learning how to use their personal computers. Apparently it wasn't well received, and Knoware recently filed for liquidation.

Handwriting on the wall? In June 1984, Rodney Zaks of Sybex Computer Books invited 20 notable computing pioneers to Pioneer Days in San Francisco. It was a gala media event. Then, three months later, each of the pioneers received a letter from the credit manager of the Hyatt Regency which said: 'Sybex has not paid for your account and your charges have been placed on your personal credit card.' Pretty shabby, Sybex.

For a games software maker the busiest season is before Christmas, but that was when Activision laid off 30 more workers. In just a year, the workforce has decreased from 400 to 150. President James Levy expressed hopes that the bottom has been reached and the market will rebound. END

Good students can learn anything. As long as they know their BBC.

Obviously, every student lucky enough to have access to a BBC computer is going to learn about computers.

But that is not the only subject they will have at their fingertips.

For the BBC school computer can enhance virtually any subject on the school curriculum.

Hundreds of educational programmes have been written for the BBC by educators in the U.K.

This material, which is of a singularly high standard, was prepared to achieve a major British Government policy objective of computer literacy in schools.

In addition, a number of State Education Departments in Australia have written a range of curriculum specific software to plug any cultural gaps.

To simplify the learning process (not to mention the teaching process) the BBC system allows each student in the class to progress at his or her own pace.

Unlike the traditional classroom, no one is held back by the other students or, conversely, left behind.

Even the language of the computer, BBC Basic, is easier to operate so students can begin computer programming much earlier.

In short, the BBC is the computer for learning.

And once again, the British Broadcasting Corporation has helped make the learning process a pleasure.

The BBC school computer.

For more information on the BBC microcomputer and the new compact version, the Electron, send this coupon to: Barson Computers Pty. Ltd. 335 Johnston St., Abbotsford, Victoria 3067, or 7 West St., North Sydney 2060. Or phone Barson Melbourne on (03) 419 3033 or Sydney (02) 957 2588.

Name: _____

School: _____

Address: _____

Postcode: _____

BARSON COMPUTERS

COMMUNICATIONS

This is the chance to air your views — send your letters to 'Communications', Australian Personal Computer, 77 Glenhuntly Road, Elwood, Victoria 3184. Please be as brief as possible and add 'not for publication' if your letter is to be kept private.

Doubtful pleasure

These days everyone is obsessed with the cult of calling everything by its initials, and in your November issue you refer, in three places, to Artificial Intelligence as 'AI'. On page 80, Michael Stevens tells us that AI is concerned with choosing which particular event 'has more value (or gives greater pleasure?) than others'. Beware!

For decades the farming community has used the initials AI for Artificial Insemination. It needs no computer to tell you that this brings very little pleasure to the bulls (who prefer the old-fashioned methods), and none whatsoever to the cows. The community itself will derive little pleasure in seeing its abbreviation hijacked by the upstart electronics industry. That industry bellyaches enough about 'program piracy', but does not itself seem to be above abbreviation piracy.

There could well be misunderstanding were an enthusiastic computer salesman to assure a farmer that within a few years the whole of his administration will be handled by AI!

J English

GOTO a deep discussion

APC articles are invariably informative and thought-provoking, but David Bradnack's presentation in 'GOTO, Thou Sluggard' (September *APC*) was excellent. If articles were rated as to the pleasure they gave the reader simply through style and wit, this masterpiece would rate 100 per cent every time.

I still haven't read it in its entirety (I'm going to cheat and load it into my micro as a series of PRINT statements with appropriate GOSUBs) and Mr Bradnack even caught me on the hop with statement 180.

I have to confess to being a proponent of the modular approach to programming, and I do write many routines in the manner which has been so cuttingly presented. Yes, Mr Bradnack, you *have* made your point, and very cleverly too.

I take issue with the association between GOSUB and structured programming; along with the BBC Micro, my much-maligned TI-99/4A is capable of producing programs using the procedural approach. The procedures are called 'sub-programs' and are, I believe, slightly more powerful than the BBC PROC. Without going into deep discussion of either the merits of the TI-99/4A (there are very few) or of the structure of sub-programs, there's one highly important difference between a subroutine and a procedure.

Whether your programs are peppered with GOTOs or laced with GOSUBs, if an error is encountered, the computer will (usually) stop and issue a report of some description together with the statement number at which the error became evident. Your task is then to decipher the route taken by the interpreter from the start to the point in question. After even a few minutes processing, this can be an impossible task.

While I can't speak for the PROC function, the use of sub-programs on the TI-99/4A provides an 'audit trail' which is presented to you automatically whenever it encounters an error. The kind of horrendous error generated while nesting subroutines causes no problem with nested sub-programs, as all steps are detailed for you. The typical TI screen presentation might be:

```
*BAD VALUE IN 4010
IN HEXDUMP
  CALLED FROM ASSIGN
  CALLED FROM SPLIT
  CALLED FROM GETCHAR
  CALLED FROM SCRCHK
  CALLED FROM INTRO
```

From this you know exactly the route that the interpreter took and can follow at a leisurely pace with pencil and paper. The use of GOSUB does mean that any route can be followed provided that you can: (a) retrieve all the unresolved RETURN addresses from the GOSUB stack *and* relate them to your program; and (b) be sure that no overflow of the stack occurs, losing some of the unresolved RETURNs. GOTO gives you none of this information.

While I do not accept the near-hysterical outbursts from some academics with respect to GOTO, Basic and brain damage, I am equally cautious about accepting Mr Bradnack's contention that selective use of GOTO in place of GOSUB is a preferable approach.

Finally, whatever your views on GOSUB, GOTO, Life, The Universe, and Everything, you have to admit that Mr Bradnack would have an excellent future as a politician!

P Brooks

Unknown errors

As the owner of a Commodore 64 I have a few enquiries about a recent error I discovered while working with disk files. The following program demonstrates what I mean:

```
10 B$=CHR$(34)+CHR$
(34):A$=B$+"DATA"+B$
20 OPEN 1,8,15:OPEN
2,8,1,"DATA FILE"
30 PRINT#2,A$
40 CLOSE 2
50 OPEN 2,8,2,"DATA
FILE":INPUT#2,C$
60 PRINT C$:CLOSE
1:CLOSE 2
```

Obviously the interpreter will be confused by the double quotes at both ends of the string, but when you RUN this program, the computer generates a ?FILE DATA ERROR IN 50. A quick look in the reference guide reveals that this error does not exist, and it is not listed in either the 64 user manual, reference guide, drive manual or any of the other numerous books and magazines I have on the 64. Why is this error not listed? What in fact does it mean? Is the computer generating errors even Commodore is unaware of? Any suggestions will be much appreciated.

A great magazine, but how about some more room for adventures? A page on Zork tips, or how about some reviews of Level Nine adventures?

R Howlett

(Hope the following at least partially satisfies your hunger for Zork tips.

With qualifications like these, shouldn't this teacher be at your school?

Only one teacher in the world comes with credentials such as these.

The teacher is a computer.

The BBC school computer.

You'll understand why it's such a good teacher, when you consider those responsible for its education.

The professors from the Computer Studies faculty at Cambridge, for example.

The panel of experts on educational television from the BBC, to name another.

Along with the hundreds of members of the teaching fraternity, both here and in the U.K., who developed the software.

Without doubt, there is no finer educational tool you can give to the teachers at your school.

And certainly, no other teaching system quite compares as far as the students are concerned.

There is, however, one important consideration we have yet to mention.

The price.

What other teacher offers such impeccable qualifications for just $859?

For more information on the BBC microcomputer and the new compact version, the Electron, send this coupon to the Australian distributor, Barson Computers Pty. Ltd.

The BBC school computer.

Post to: Barson Computers Pty. Ltd., 335 Johnston St., Abbotsford, Victoria 3067, or 7 West St., North Sydney 2060. Or phone Barson Melbourne on (03) 419 3033 or Sydney (02) 957 2588.

Name: _____

School: _____

Address: _____

_____ Postcode: _____

BARSON COMPUTERS

*$859 tax free price to schools. $999 recommended retail

COMMUNICATIONS

Anyone with a solution to R Howlett's problems should address it to 'Communications' — Ed)

Zork clues

With reference to 'Zork obsession' in the November issue of *APC:*

What a relief it is for someone to know how to win Zork.

First of all: there is a chest on the cliff edge. Take it, and wait for a man to come down. He will ask you to tie the chest to the rope. Do it.Wait a while longer, and he will ask you to grab the rope, which you should do. He will have now opened the chest and taken the jewels out. Don't try to take them from him. He will give you a staff.If you try to get the jewels, the staff will break. Keep the staff, you will need it later.

Secondly: in Zork II, to get past Cerberus, you must put the collar from the kennel on the dog to go east.

Thirdly: in Zork I, to move the coffin you must either get the sceptre which is inside the coffin and wave it, then put it in the boat and go to the Altar.

Lastly: in Starcross, put the gold rod in the slot and the clear rod in the slot. Five slots will appear. Put the coloured rods in their coloured slots. Push the large pink square to set the course towards the inner solar system. Push the brown spot to choose your destination. To get to earth, press the brown spot four times. The violet spot chooses how you want to come in. Push the violet spot three or four times. The green button chooses speed. Push green twice. Push blue to launch. You have now won Starcross. (That's sneaky of me to spoil it all!)
D Chu

Hi-tech trepidation

As now a regular reader of your magazine I thought I would give you a piece of information that you could pass on to your international travelling users of lap computers.

Our subject destination is Jakarta, Indonesia and our subject matter is Temporary Importation of your Travellers Best Friend — your lap computer which you are using for word processing, (keeping trip report notes), and a spreadsheet, (for keeping trip expenses up to date).

Of the many countries I have visited Jakarta is the only one exception to the rule of importation of a personal computer. I arrived in Jakarta for a three day business trip to horrifyingly learn from the customs man, who searched my bag in a most meticulous manner to ensure that I was not importing any other gremlins, that radios and *computers* are prohibited imports even on a temporary basis and that I would have to leave the computer at the airport in the care of the customs and with the hope that I may pick it up on my departure, the computer intact and still in working order.

For those who have visited Indonesia this is considered to be a distant possibility.

So, after a full day of arguing with customs officers I was granted a temporary import status and provided that I presented the computer and myself at the airport an hour before the scheduled check-in time, these items could be re-examined to ensure I had left nothing behind.

For the purpose of reference I have a Sharp PC5000 and, for travelling with the Sharp, a rechargeable battery, my second recharger, a Superwriter bubble, a Supercalc bubble and two database bubbles.

All this packs into a very well designed briefcase that stays on board the aircraft with me like my only friend in flight.
R Mill

Introducing the Smith-Corona Printers

Meet the Smith-Corona printers, 3 of the highest quality, yet reasonably priced printers, to meet your toughest demands.

With superior print quality and proven reliability backed with exceptional service and support, these dot matrix models are compatible with all business micros, PC and home computers and are fully compatible with **IBM** and **EPSON** printers.

SPEED-From 80 cps to 160 cps with bi-directional and logic-seeking features. **FLEXIBILITY**-Six pitches, up to 128 variations of type style and seven international character sets. **QUALITY**-Consistent high quality printing, true descenders, 160 cps draft, 40 cps NLQ, superb graphics capability too! **PRICE**-We believe the Smith-Corona has the best price performance of any machine in Australia, ring us and find out just how good they are.

Smith-Corona Data Products
81 Regent Street
Redfern 2016
Ph: (02) 698 8211

COMPUTER SERVICE

Ask these questions to yourself

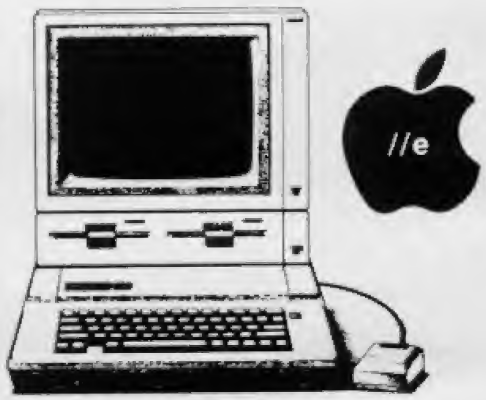
Am I using my computer for more than 5 hours a day?

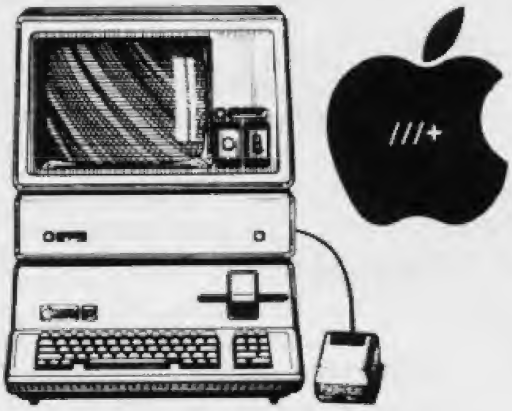
When was the last time I had my computer and disk drives checked?

If you use your computer for more than 5 hours a day and the last time you had your computer and disk drives checked was more than 4 months ago, then it's time to get them checked by the specialists at New Generation Micro Services.

A Complete Computer Preventative maintenance check including disk drive alignment, main Ram, Rom, video, serial and parallel ports will only cost you $80.00, in the months of January and February. (Only for IBM PC1, PC2, XT, Apple II +, IIe.)

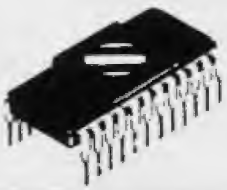
- This service includes a three months' warranty.
- On site work also provided. Please ring for quote.





Don't forget to ask about our fantastic service contracts too.

Right now we're equipped to handle service on: IBM, PC1, PC2, XT. Apple II +, IIe, IIc, III. Osborne II, most Apple and IBM compatibles.



SCARLAN PTY LTD (Inc. in N.S.W.)
T/A **NEW GENERATION MICRO SERVICES**
REAR 229 BURNS BAY ROAD, LANE COVE WEST 2066. Telephone (02) 427 0314

ORIENT EXPRESS

Our Tokyo correspondent, Shinichiro Kakizawa, reports on what the best-dressed computer user is wearing this year and advises on matching accessories.

War of the standards

Sony's 3½in micro diskette is gaining acceptance as the *de facto* standard for the micro-size floppy disk. There has been a lot of confusion and competition on whose floppy would emerge victorious: among the competition were Sony's 3½in, the Hitachi and Matsushita group's 3in and Dysan's 3¼in. The reason for the standard is that the world's largest disk drive manufacturer, Y-E Data Company of Tokyo, has recently announced the result of its year-long evaluation on micro disks. The company's report concluded that the 3½in was the best for business applications, taking into consideration the manufacturing costs of the drives.

Y-E Data spent more than a year evaluating drive production technology, which included the drive performance and reliability aspects of both the 3in from the Hitachi/Matsushita group, and the 3½in from Sony.

With Y-E Data's announcement, the number of manufacturers adapting to the 3½in drive will probably increase dramatically.

The focus of Y-E Data's evaluation was placed on a drive's reliability in business use when mass produced at low cost. For business use, a disk drive must be compatible with 8in disks and have a storage capacity of 1.6Mbyte per disk. Y-E Data concluded that the mass production 1.6Mbyte 3in drive will be far more costly compared to the cost of producing a drive of the same capacity using 3½in technology.

Toshiba has received an OEM order of one million 3½in diskette drives from the US giant IBM. Toshiba was among the 20-plus contenders who fought for the big order. Toshiba has only recently joined the disk manufacturing business, and had originally been planning to produce 3in drives. However, because of IBM's decision and Y-E Data's evaluation, it quickly switched its production line to the 3½in drive. The company's production capacity is presently 200,000 units per month. It would now appear that buying a 3in series diskette drive, other than the 3½in Sony version, would be risky.

Y-E Data has not yet revealed its findings on the disk size for home hobby computers.

Watch this space

Casio has started shipping data bank wrist-watch computers. The new watch, called the 'Casio data bank read sensor', can recognise the handwritten alphabet and numeric characters. Characters you write on the glass surface of the watch with your finger become the input data to the watch and are consequently stored in its memory.

The watch can store a maximum of one kbyte of data — the equivalent of 50 names and telephone numbers. Each entry consists of eight alphabet characters and 12 numeric digits. The watch features an eight-digit calculator function which also uses the same handwritten character recognition.

The product costs $70, and is the result of Casio's integration of its two earlier products — the character recognition wrist-watch calculator and the data bank wrist-watch with touch-key input function.

Lighter printing

Liquid crystal printers claiming to be the next generation printers will be available soon. Epson and Casio have both announced their products for the spring. The liquid crystal (LC) printers print one full page at a time — and have a similar capability to laser printers. However, the cost of an LC printer is much cheaper than a laser printer due to its simple printing mechanism. It can also produce a very high quality printing result at high speed.

The heart of the LC printer is the part called the 'liquid crystal shatter'. Light is unable to pass through the liquid crystal board when a certain amount of electric voltage is applied. As soon as the voltage is removed, however, the light can freely pass through. So, by inserting a number of micro-size liquid crystal boards between the light source and the light-sensitive drum, the LC shatter controls the printing function.

Unlike a dot-matrix printer which forms characters by arranging the dots, the LC printer can achieve a high quality and high density printing result, and reverse printing is a very simple process.

IBM moves to Japan

IBM Japan has announced a series of new 16-bit micros for the Japanese market. The machines are marketed as the lower end systems of the existing IBM 5550 16-bit business micro which has sold well in Japan for nearly two years. The new series consists of four models — JX1, JX2, JX3 and JX4 (the JX1 is the low end system and JX4 the highest). The series was designed by Fujisawa Lab of IBM Japan, and Matsushita will manufacture them — which is the same arrangement as its predecessor, the 5550, had.

All JXs use the Intel 8088 chip (the same as the IBM PC and XT) and run PC-DOS 2.1 (the JX version). This processor/OS combination makes the new machines program-compatible with the IBM PC. Data compatibility is also offered with a 5¼in diskette. With this data and program compatibility, the vast choice of PC software has finally reached Japanese shores.

Going into overdrive

Hitachi has developed a desktop mass floppy disk drive which has a capacity of five gigabytes per spindle. The machine stores 500 tightly-packed 8in floppy disks in a small, sealed case and rotates all 500 together by a powerful motor.

The most notable feature of the device is its low cost. While it offers a massive storage capacity comparable to higher end hard disk drives, the cost per bit of the new device is only one tenth of the hard disk because it uses low cost floppy disks. Each floppy disk is separated by a 'spacer' made of stainless steel.

The data transfer speed of the device is 0.7Mbytes. This is faster than an optical disk. An interesting development to watch.

Dressed not to kill

A special cloth to protect the human body from potentially harmful electromagnetic radiation has been announced from Takase Co of Osaka. Government health authorities in Japan have not yet reached any specific conclusion as to the risk of radiation on the human body, but Takase has quickly taken advantage of the average VDU user's fear.

The idea is that by wearing a cloth made of a special material called 'metax', you are protected and safe from the effect of the harmful electromagnetic fields commonly found in any computing hardware environment. Metax is made of polyester and coated with a thin nickel film. It is claimed to help reduce the electrostatic charge in the human body.

Data General One

Well-known minicomputer maker Data General has taken a courageous step in launching a portable micro in an already crowded market-place. But a machine which offers IBM compatibility and a 25-line LCD could attract the 'mobile' executive — and such is the company's aspiration. Peter Bright gives it the once-over.

Enter the One, a new lapheld micro from Data General (DG) a firm better known for its minis. The new machine offers a 25-line LCD display, up to two built-in disk drives, IBM compatibility and up to 512k of RAM all running from rechargeable batteries in a lapheld package.

Hardware

From the side the DG One looks like a small toboggan: the bottom is flat but gradually slopes up towards the front. I'm sure that if anyone ever made any decent-sized replicas, you could get up quite a speed riding one on a good snow-lined mountain.

The machine is finished in two-tone light and dark brown. When closed up it measures just 35 x 30 x 7 cms, which is just about small enough to fit into the *APC*-standard briefcase. It was, however, a very tight fit and there wasn't even room for a couple of 3½in disks. According to the specification the whole unit weighs four kilograms — it felt much heavier when I was carrying it home and the scales in the office put it at five and a half kilograms.

When the unit is closed up it looks very secure. There are no holes or ventilation slots, and the only visible means of entry is the slot (or slots) for the internal disk drive(s). The only thing it lacks is a carrying handle; Epson got it right with the PX8 which has a nifty little handle built-in.

To start the machine you press in two catches on the front and hinge the lid up: this lifts to reveal the keyboard, LCD and the on/off rocker switch. One of its nice features is a hi-tech auto power off device built into the lid. When you close the lid, a lump of plastic hits the on/off switch and rocks it to the off position.

There are two other covers on the machine. One is on top just behind the lid and hides the battery compartment. The basic machine runs on Duracell-type batteries, but the review machine came with the optional extra rechargeable batteries.

The other cover is at the back and hinges down to form a foot which lifts up the rear of the machine. It also reveals the I/O and external power ports. This cover is the worst-designed piece of plastic I've seen in a long time — I've got the cuts on my fingers to prove it. It had a nasty habit of collapsing when I least expected it (usually when I was plugging in a cable) and then not closing when I wanted it to.

The keyboard is very cramped: 79 keys are squeezed together tightly

I/O is fairly limited on the DG One. Along the back panel from left to right we have: internal modem output, two RS232 ports (one printer, one external modem), the system expansion bus, and two power inputs.

It's odd that there should be two power inputs. One is for running the system and the other is for the battery charger, but I don't know why DG couldn't charge the batteries from the system power input. The result is that the machine is supplied with two separate power transformers — one for the batteries, one for the system.

Getting inside the machine is difficult. I tried but gave up admitting defeat, which isn't surprising as CMOS chips are notoriously sensitive and DG doesn't want people poking around inside the unit.

There are no ventilation slots in the casing — they aren't necessary. Most of the DG One's electronics are CMOS which not only means that it uses much

Verdict: good for tobogganing but, more importantly, two built-in 3½in disk drives

less power than normal machines, but also that it runs much cooler. The casing didn't even get warm on the test machine.

The main processor in the DG One is an 80C88, the CMOS version of the popular Intel 8088 processor used in the IBM. One of the DG One's major advantages is that it's compatible to a large extent with the IBM PC, thus giving it access to a large range of hardware and software.

The basic DG One is supplied with 128k of RAM; the review machine was the fully expanded 512k model. The chips used are CMOS 64k static RAM chips. Interestingly, although the RAM is CMOS, it isn't battery-backed. This means that when you switch off the machine, you lose all the data in the RAM. According to DG, battery-backing a 512k machine would write off your batteries too quickly.

The basic model comes with one built-in Sony 3½in disk drive as standard: this is a double-sided unit giving a total formatted capacity of 720k. As the review machine was the expanded model, it had two 3½in drives built-in. In addition to being small these drives also use less power than 5¼in drives, so it's feasible to run a machine with disk drives from batteries.

The manual states that the batteries will last for about eight hours with average disk access, but obviously the more you use the disks, the shorter the batteries will last. When the battery level is getting low, a message appears in the bottom left hand corner of the display to warn you, but the machine doesn't lock up, so you can close down in an orderly manner.

The DG One has an interesting range of optional extras. In order to be hardware as well as software compatible with the IBM PC, an external 5¼in IBM compatible disk drive can be plugged into the expansion bus. Another external module is available which holds a 5¼in drive and also houses IBM compatible expansion slots, which means that IBM cards can be used with the DG One. A small thermal printer is available too.

The external hardware options were not supplied with the review machine.

The executives at Data General must have been kicking themselves when ACT beat them to launching the world's first micro with a 25-line screen (the Portable). The Data General staff can console themselves with the knowledge that they've done a much better job.

The great thing about the DG One's display is that whereas the ACT Portable uses a wide, short screen to display its 80 characters by 25 lines, the screen on the DG One is almost square and is the same size as a 12in monitor screen. This not only means that there's more height to play with, but also has the psychological advantage of looking more like a conventional micro display.

The official specification of the LCD display is: 80 characters by 25 lines in character mode, or 640 x 256 pixels in bit-mapped graphics mode. This can be downgraded to 640 x 200 pixels in IBM compatibility mode.

Large LCDs take a lot of decoding to work, and the DG One uses two custom-designed CMOS gate array chips to handle the display. In addition to normal display functions, Data General designers have designed comprehensive IBM display emulation into the gate arrays, so that the display on the DG One can emulate both the IBM monochrome and the colour graphics adaptor under software control. If an application package is designed to display colour graphics, then it will be grey-scaled on the DG One.

In use, the LCD display on the DG One is better than those on most other machines I've seen, but still bad in absolute terms when compared with a CRT. One of the problems is that although the display hinges up, you can only use it at one angle. You can't vary the angle as on machines like the Hewlett Packard HP110. You can, however, adjust the contrast of the display by using the CMD key and the up or down arrow keys. This helps to some extent, but you still need to position the machine carefully to get good results. Not surprisingly, I found that the display was at its best in natural light and at its worst when sitting on my desk at home lit by a single 100 watt lamp.

The characters are nicely formed and looked very like the characters found on a VDU, but the 'shadow' characters on the HP110 are superior.

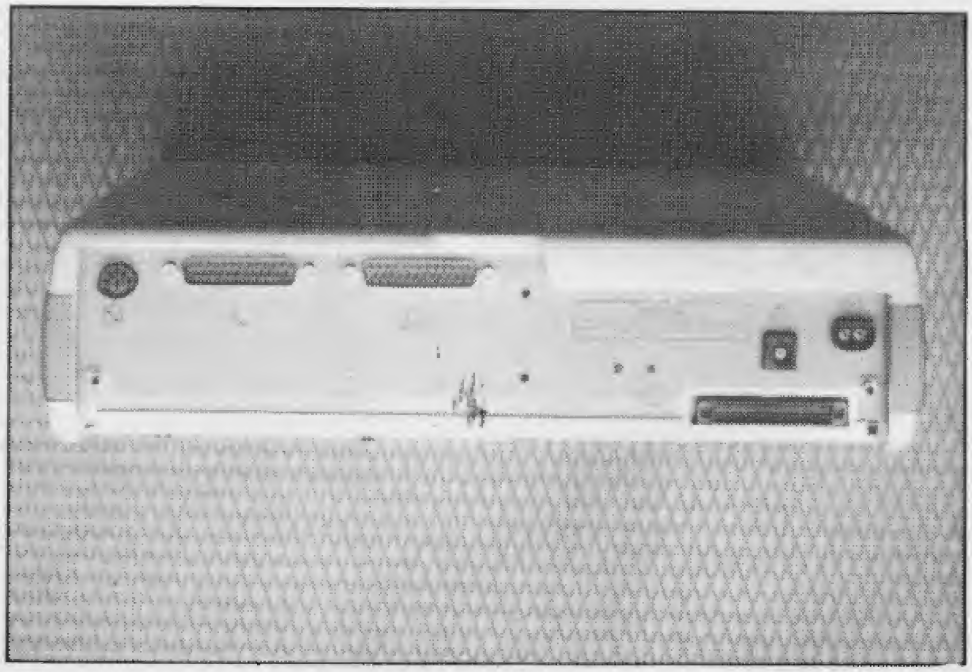
When the unit is closed, the keyboard is hidden underneath the display. As soon as you open the unit to use it, the display hinges up to reveal the keyboard. As on most portable machines, the keyboard on the DG One is cramped. It contains a total of 79 keys, all squeezed together tightly.

The first thing you notice about the keyboard is that for a machine purporting to be IBM compatible, it's very un-PC like. I suppose this in unavoidable in a portable, but it plays havoc with the pretty keyboard overlays for programs like Framework.

The overall look is very old fashioned, but I'm not sure whether it's because of the cream and brown colour scheme or because the keys look like they're built on two levels. Everyone who saw it commented that it reminded them of old mainframe terminal keyboards.

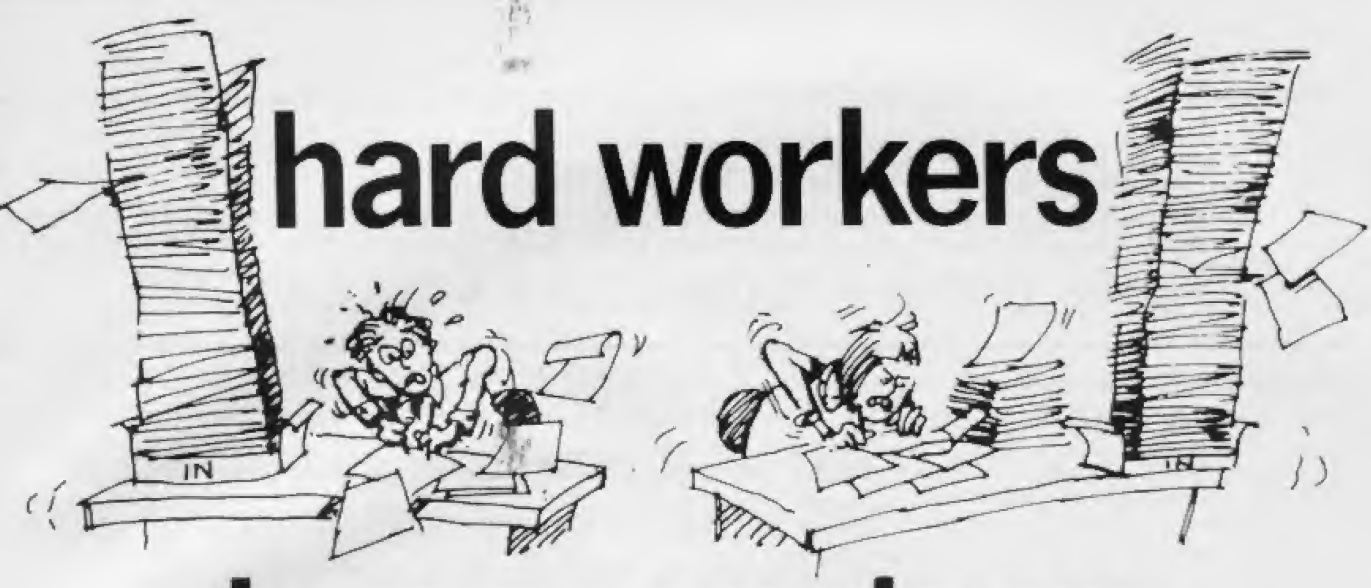
The layout of the keys is fairly standard. The main qwerty section is set in the middle and coloured a darker brown to distinguish it from the editing keys. The 10 function keys are set out in a row along the top of the keyboard. Above the function keys is a space for a function key strip which can be used with applications custom designed for the DG One.

The cursor control keys are set out in a line to the right of the space bar. This at least is an improvement over the IBM PC where they're incorporated into the



Internal modem output, two RS232s, the system expansion bus and two power inputs

hard workers



happy workers

WORDCRAFT HELPS!

How much of your time is spent typing, filing and mailing? What if you could cut that time in half, or more?

Wordcraft helps. No more crying over errors in a lengthy document. No more searching for hours through your filing cabinet. No more retyping the same letter to 10 people. No more tedium!

With Wordcraft it's all in a touch of your keyboard. Not only can you find your files, they're the same on the screen as on your paper. Interested? Read on.

Goodbye typewriter

Some things your typewriter can do already. Like centring. Or underlining. How long does it take? With Wordcraft at your fingertips, it's split seconds. Important points in bold or italics? Easy.

There's more. Delete a word, sentence or paragraph. Add a new one if you like. Move your phrases with a few keystrokes. Is there something you could use from a previous document? Call it up and slot it in. A sentence you often use? Don't wear your fingers out – Wordcraft puts it in for you.

What page are you up to? Wordcraft knows. It's been counting. When you print out your perfect document, page numbers miraculously appear.

Goodbye filing cabinet

Well you'll need a very small one. To keep other people's correspondence in. Yours will all be on neat little disks. If you want to find a file, call up the directory and it's there for you to see. Or change. Or print again.

Say you'd like to send something to a number of people. Forget the photocopies. Just select their names from your mailing file and it's printed with each name and address inserted automatically. How long does that take you now?

Goodbye dictionary

How many times have you typed a massive document only to find it has spelling errors? Then there's the dreaded 'teh', and 'adn''. Messy.

Wordcraft has a built in Oxford dictionary (not American spelling), plus room for your own words. Put in technical terms or business names. Let Wordcraft check your spelling and eliminate another chore.

Goodbye calculator

Wordcraft's full function calculator will process figures within your document any way you like. Or you can use it independently.

Goodbye computer fear

All the computer power in the world isn't going to help if you can't use it. Wordcraft comes with a Self Instruction Manual that takes you through step-by-step. It's easy to read and gives you a little test after each manageable section. So you can be sure you've understood.

Afraid of hitting the wrong key? Wordcraft has 'undo'. This lifesaving feature takes you back one step so you can do it right.

Say Hello to Wordcraft

It's about time you were rescued from tedium and inefficiency. We've mentioned only a few of the ways Wordcraft can do just that. Why don't you call us for more information. We'll show you how to make hard workers happier. And your bank manager smile.

Wordcraft software runs on 16 bit computers. IBM PC and XT, and most compatibles, Sirius, Apricot, Hewlett Packard HP150, DEC Rainbow, Olivetti M24, NCR DecisionMate, Olympia People.

Personal Computer Services Pty Ltd

Phone: (02) 923 2899

Or send for the Wordcraft brochure to:
P.O. Box 1059, Crows Nest 2065.

Name _____

Address _____

_____ Postcode _____

4921/1

PORCHESTER Computers

AUSTRALIAN DISTRIBUTOR OF LOGITEC PRODUCTS

• MAIL ORDER • PHONE ORDER • CALL-IN

BEST FEATURES AND VALUE IN IBM PC COMPATIBILITY

The LOGITEC is a high quality fully-featured 16 bit computer which runs the IBM PC compatible operating systems, and applications software.

We have run a wide range of compatible software on this system, including the popular Lotus 123, and Flight Simulator and it all runs perfectly. Network (optional) hardware and software also runs on this incredible packaged system so that you can cope with that multi-user requirement.

INCLUDED STANDARD WITH LOGITEC

- *PC DOS operating system*
- *256K RAM*
- *RS-232 port*
- *Centronics Parallel port*
- *Real Time Clock*
- *RGB color 80 x 25 text*
  640 x 200 graphics
  Monochrome output
- *130 watt power supply (with fan)*
- *2 Floppy Disk Drives (720 Kb)*
- *Quality control for 72 hours on every system*

OPTIONS

- *XT 10 Mb Hard Disk*
- *Network*
- *Hi-res Color and Monochrome monitors*
- *MSDOS and CPM-86*

6 MONTHS WARRANTY FROM HILLS!

LOGITEC 16 BIT PC

RUNS IBM PC SOFTWARE AND HARDWARE OPTIONS

The best in Japanese quality & reliability backed by Australia wide service from Hills

LOGITEC PC-1600

Direct from KANTO DENSHI CORPORATION in JAPAN

PC-1600 dual floppy system ..... $3295 inc.
XT-1600 10Mb hard disk system ..... $4990 inc.

PORCHESTER provides technical advice and consulting on all aspects of your business requirements. Specialised software is available for Real Estate, Insurance Broking, Accounting, Word Processing etc. Call in or phone!

First Floor
169 Victoria Parade,
Fitzroy, Vic 3065

68 Punt Road,
Windsor, Vic 3181
(NEAR ST. KILDA JUNCTION)

(03) 417 6999 (03) 51 7647

SOFTWARE SPECIALS!

FOR THE LOGITEC PC-1600

ACCOUNTING

Integrated Debtors, Creditors, General Ledger Stock
All inclusive only $349

PERFECT SERIES

Perfect Writer $349
Perfect Calc $295
Perfect Filer $295

PLEASE CONTACT US FOR YOUR NEAREST DEALER

Even the fastest fingers slow down when they struggle with computer commands. And no matter what software you use, you still have to enter the same things over and over again.

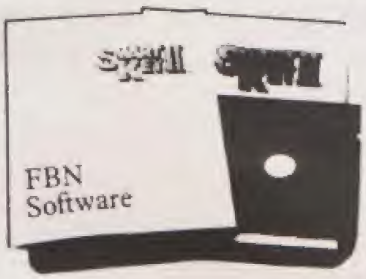
That's why you need SmartKey II,™ the software that lets you control your computer with a single keystroke.

Add SmartKey II™ to WordStar and you can juggle margins and insert "boilerplate" paragraphs or sentences with just one key. Add it to Lotus 1-2-3 and you can concentrate on the numbers instead of the mechanics.

Don't type in the same thing twice. SmartKey II ™ can remember commands, words, paragraphs, even entire letters. With SmartKey II,™ you can work faster and never worry about which keys to press.

It's easy to see why thousands of people all over the world are already using SmartKey II™ to make their lives easier.

SmartKey II™ features.
Assign more than 3,000 characters to a single key.
Define over 300 function keys.
An exclusive "SuperShift" lets every key have up to four meanings.
Change any keyboard to the Dvorak layout.
Keys can be redefined while other software is running.
Key definitions can be saved to disk for later use.
SmartKey II™ is invisible to other software.
SmartKey II™ runs on the IBM PC and compatibles, the PCjr, the Kaypro II, 4, and 10; plus all other MS-DOS, CP/M and CP/M-86 based personal computers.



Best of all, SmartKey II™ is only $69.00 plus tax.

To see how SmartKey II™ can speed up your work, pick up a copy at your computer dealer. It's the smartest move you will ever make.

FBN Software,
16 Coles Place,
Torrens,
ACT 2607
(062) 861102
Dealer enquiries welcome

SMART KEY II™

A Stroke Of Genius.

The ten slowest parts of your computer.

Success is your

HITACHI

Hitachi have cut the price of their MBE 16002 personal computer by $2,000. So now there is no reason to compromise on quality when choosing a computer for your home or business. The Hitachi "Success" offers you features like...

State of the art hardware

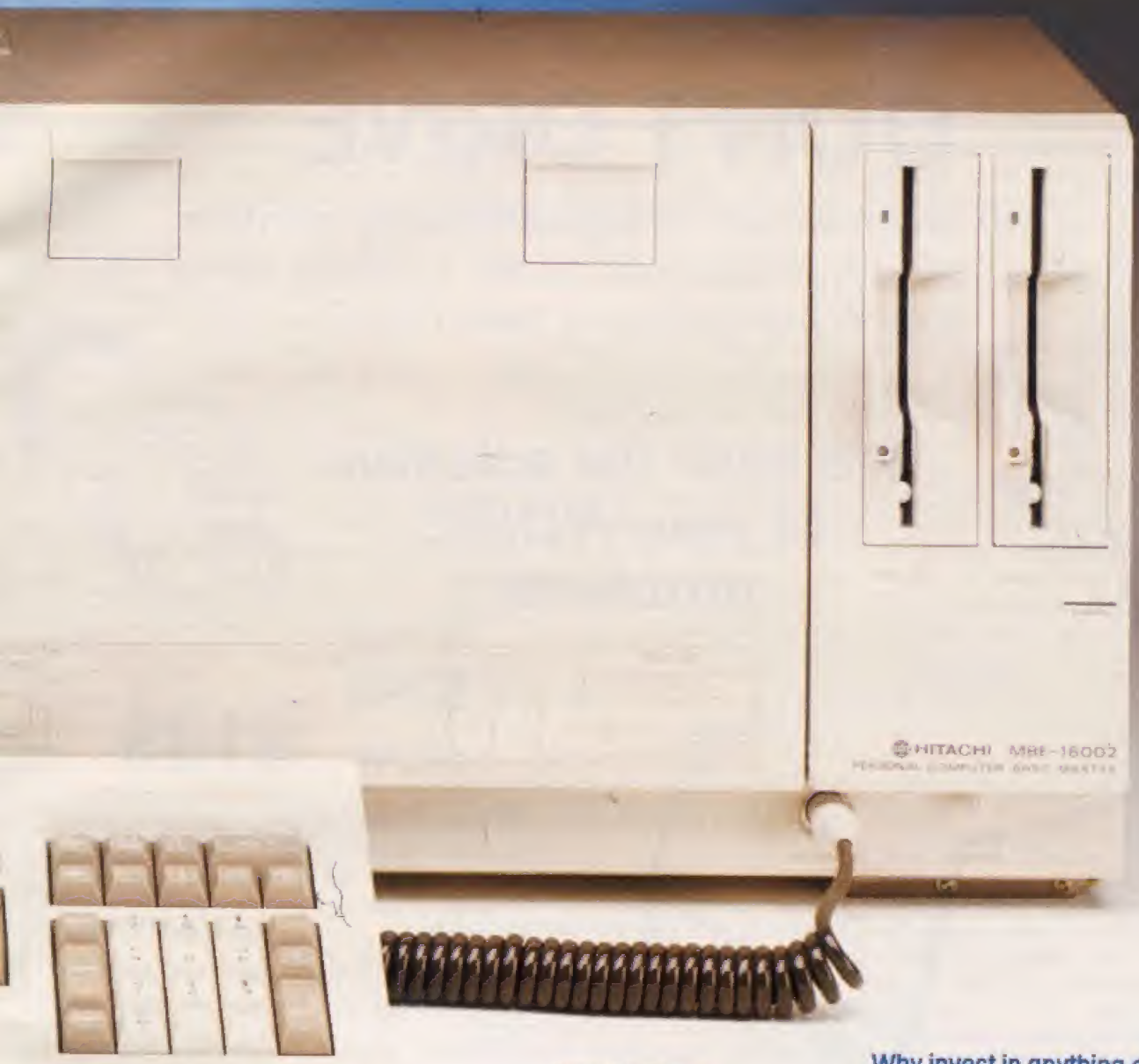
Gareth Powell of "The Weekend Australian" described the Success as "a leading example of the new breed." The RGB colour monitor he said had "the best resolution I have seen on a personal compute

Compare it with any other pe computer. We think you will

All the software you could n

Your Hitachi dealer is willing help you get started with gre reduced prices on any of the following soft-ware when bundled with the Success. Y can run LOTUS 123; Multim

or only $3995



rdstar 3.3; D Base II or III;
che Accounting Software,
l many more.

ge resources behind you

Hitachi Corporation's sales for
year were in excess of 19 Billion
. Dollars. In short, they have the
ources, the technology, and the
ncial stability to be around for a
y long time.

Specifications

The Hitachi 16002 comes with 128K bytes of user RAM (expandable to 384K); dual 5" DS/DD Disk Drives; new IBM graphics card; 16 bit CPU; High resolution colour monitor; MS Dos and Basic.

robs
COMPUTER CENTER
295 Thomas Street, Dandenong 3175
Phone (03) 791 2900

Why invest in anything else?

With this sort of value for money you should ring your nearest Hitachi dealer now and let them tell you how Hitachi can help you, your family, and your business to success. Hitachi Success.

Authorised Hitachi Dealers

N.S.W.: Professional Computer Solutions (02) 630 6933; MicroDelta; Drinday.
VIC.: Robs Computer Centre (03) 791 2900.
QLD.: Software 80. (07) 369 6888.
S.A.: Metropole (08) 223 5538.

IK-50

Dealers Welcome

Le disc

DOUBLE DOUBLE
SPECIAL OFFE
from de Vere Computer Accesson

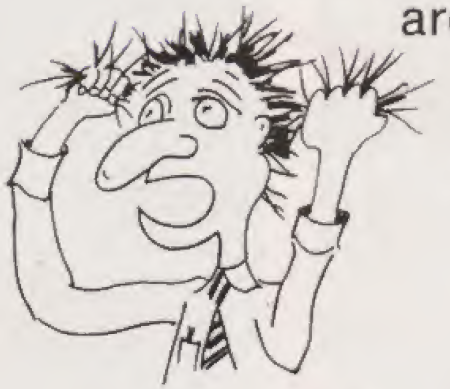
LE ACCOUSTIC HOODS

NOISE SUPRESSION UNITS

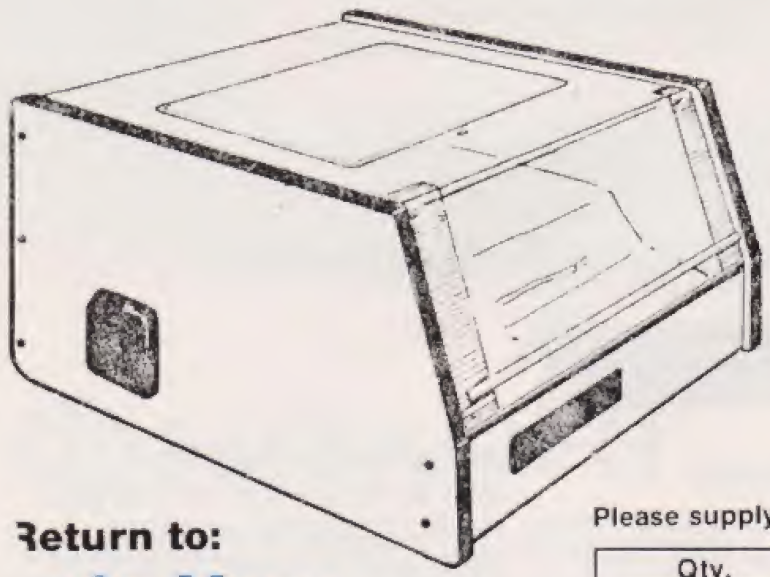
DON'T DRIVE

your environment crazy with noisy printers.

There's nothing worse than noisy printers while you are on the phone or watching TV.



We have the solution to your NOISE problems.



Normally
$299
NOW **$199**

de Vere product range

Le disc's Super discs — Xidex discs
de Vere discs — Nashua discs
Verex discs — bulk discs
Computer printers, ribbons and terminals.
Computer tapes, hard disks and disk drives.
Computer storage containers and paper.
Microcomputers and word processors.

Return to:

de Vere Computer Accessories

294 Kingsway (cnr Park St),
Sth. Melbourne 3205.
Telephone (03) 690 8955.

Please supply:

Qty.	Goods	Price	Sub. Total

NAME
ADDRESS
Ph P'code

Post $_____
Total $_____

numeric pad. The DG One doesn't have a numeric key pad as such, but the functions are built into the right-hand portion of the typing area. This can be a problem if you don't realise that you have NUM LOCK engaged and get '5's instead of '1's.

The DG One has more than its fair share of control keys. In addition to the normal CTRL, ALT amd ESCAPE keys, it has SPCL and CMD. SPCL doesn't do anything useful. To the right of the RETURN key is a blank key, which doesn't do anything useful either.

In use, this keyboard is an odd mixture. The keys are unusually well pitched for a portable machine and have a good, positive feel. It also has a number of niggling faults which makes it less fun to use than it might be.

The first problem is that if you put the machine flat on the table without the back cover opened up, the keyboard is a good inch above the level of the desk and is impossible to use. If you use it with the back flap down it goes to the other extreme and slopes up too much.

Touch typing was a problem because the right three fingers of my right hand were resting on the cursor and CAPS LOCK keys and accidentally engaging them, which is what happens when you have to fill every available space on the keyboard. Other gripes with the keyboard include a minuscule RETURN key and the fact that there's no indication that CAPS LOCK, NUM LOCK, and so on have been engaged.

Having said all that, the keyboard is still good by portable standards. The only portable with a better one is the HP110.

System software

The DG One will run both MS-DOS and CP/M-86; the review machine was supplied with MS-DOS version 2.11.

If you reset the machine (CTRL, ALT, DEL as on the IBM PC) without any disks in the drives, the machine will spend a moment searching for a bootable disk, admit defeat and drop into the ROM-based utilities. These can also be reached from DOS with CTRL, ALT and CMD, but the machine is reset so you'll have to reload DOS afterwards.

Four functions are provided from ROM — Notebook, Terminal, Set Up and Diagnostic — and are entered by hitting the appropriate function key (F1 to F4).

Notebook is designed as a basic text entry system for preparing one-off memos, and so on. As such, it's just about (but only just) acceptable. If you're going to do anything more than the most basic text editing, you'd be better off with a proprietary word processing package.

The Notebook screen is divided into two sections: the top 22 lines are set aside as the typing area, and the bottom three lines are used as command/message lines. What is immediately noticeable when typing is that when you get to the end of a line, the machine bleeps and doesn't proceed to the next line. It expects you to insert a carriage return at the end of every line just like a low-tech typewriter! What's the point of a word processor without a word-wrap?

Things gets worse when you find that although your text is stored in RAM, it's destroyed as soon as you boot DOS and there's no way of saving to disk from Notebook. Even the Tandy 100 can do better than that.

I suppose we should be grateful that editing commands are provided and you're not expected to re-type mistakes. As it is, the editing instructions are strange but effective. Cursor movement is provided by combinations of the CTRL, SHIFT and arrow keys. Notebook can store up to 500 lines of text, so page scrolling is provided in addition to character cursor movements. The command line provides five text editing commands plus commands for Search, Search and Replace, Tabulation, and Printing. The editing commands are Split Line, Join Line, Save Line, and Erase All.

Split Line allows you to move part of the text in the current line to the line below. In most word processors this is done by hitting <CR>, but here it's a separate command. Join Line is the reverse of Split Line.

Using Save Line, you save a copy of the current line of text so that it can be printed out when you hit Insert Line. The same line can be printed out repeatedly until a different line is saved.

The second ROM-based routine is a dumb terminal emulator. It offers a choice of two emulations: either Lear Seigler ADM 3A or DG's own Dasher D2. Assuming your firm doesn't have a DG machine, the ADM 3 option will get you onto most systems.

The command line allows you to select either the internal modem (of which more later), or an external modem connected to the RS232 line. XON/XOFF is provided although DG calls it OFC (Output Flow Control). Baud rate, parity, and so on are controlled from the system configuration menu.

As with Notebook, you can't upload or download disk files using the ROM terminal emulator. However, you can run input to Notebook, edit it and send it back down the line.

The third ROM routine allows you to customise the system to your own requirements. You'd probably only use this routine when you first purchased the machine, or when you added to the system.

The Set Up menu has six options: Date/Time, Diskettes, Modem, Printer, Screen and Keyboard.

Date/Time sets the internal real time clock calendar chip, and is only used when the clock batteries are changed.

'In use, the display on the DG One is better than those on most other machines I've seen, but still bad in absolute terms when compared with a CRT. One of the problems is that although the display hinges up, you can only use it at one angle.'

These are separate from the rest of the system and last two-three years.

Using the Diskettes option, you can tell the system how many disk drives you have; the valid range is one to three. There were two on the review machine as three is only used if you're using the optional external IBM compatible drive.

The Modem and Printer options set up the transmission settings for the machine's two RS232 ports. Both ports can work at up to 9600 baud with all the usual choices of data bits, stop bits and parity.

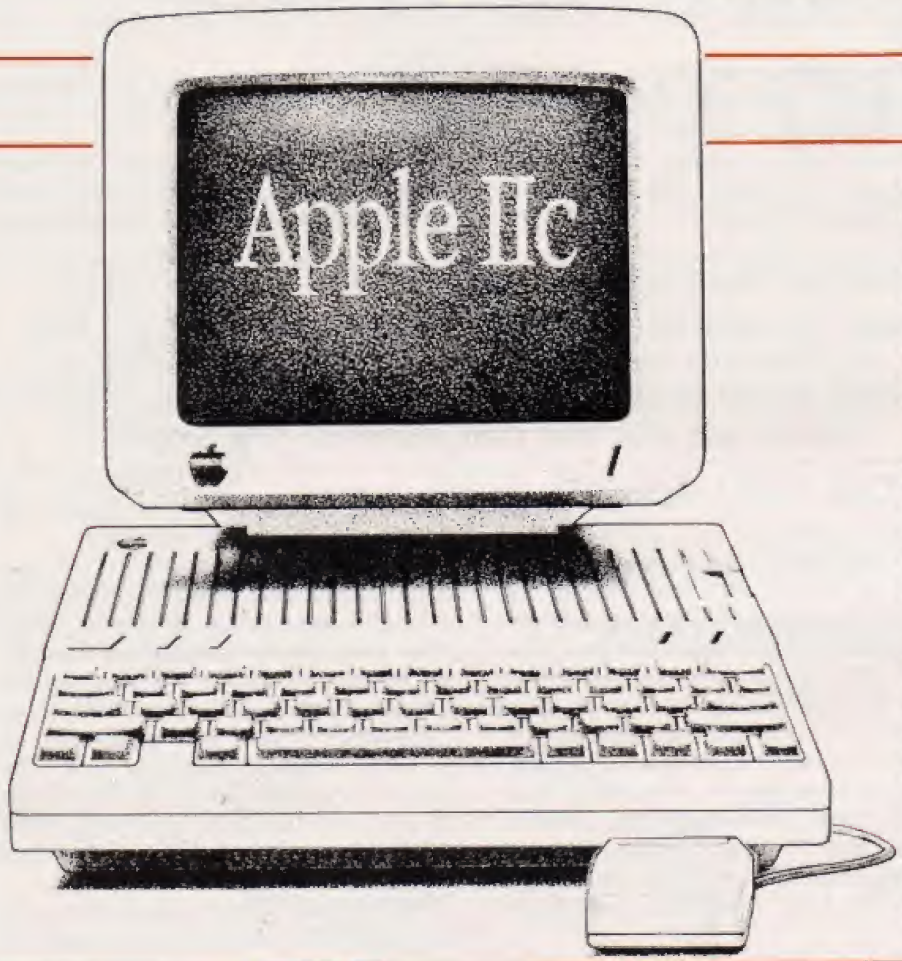
The last two options allow you to set the type of IBM display that the system is emulating and to set up the national keyboard. The system options are saved when the machine is switched off.

The final ROM utility is a set of diagnostics. These allow you to test out the system RAM, both internal disk drives and the external 5¼in drive if fitted, and all are destructive so I didn't run them.

MS-DOS version 2.11 is shipped with all DG One systems. When the system boots up, DOS takes the time and date from the internal clock so you simply accept the defaults when asked for date and time. The implementation of DOS is perfectly standard and is to be expected on a machine which is trying hard to look like an IBM PC.

The only minor addition to DOS on the DG One is an extended version of the MODE command. Using MODE you can change the values of the RS232 lines, change the print mode of the optional

The New Yea
at Rob's Com



YOUR N

APPLE IIC PACKAGES

THE FAMILY PACKAGE can give Mum, Dad the kids hours of productive fun and enjoym
You get . . .

- APPLE IIC Computer with 128K of memory built-in disk drive
- APPLE IIC Monitor and stand
- Colour RF Modulator
- Ultra high resolution graphics in 16 colours

SOFTWARE

- Apple Mouse and "Mouse Paint"
- Bank Street Writer
- Odesta "Chess"
- Broderbund "Print shop"

$1,995.00 You save **$515!**

THE PROFESSIONAL PACKAGE is a introductory package for running business applications in the home or small business.
You get . . .

- APPLE IIC Computer with 128K of memory built-in disk drive
- APPLE IIC Monitor and stand
- Colour RF Modulator
- Add-on Disk Drive
- Ultra high resolution graphics in 16 colours

JUKI 6100 DAISY WHEEL PRINTER.

Control codes are identical to Diablo Printer.

CHRISTMAS SPECIAL
$795 (1 Month only)

HITACHI 16000

Now includes a new graphics card to give far greater compatibility with IBM software

Includes

- High Resolution Colour Monitor
- 128K RAM
- MSDOS & Basic
- Printer Serial & Light pen interfaces
- Free games Disk

Was **$5,995** Now **$3,995**

NEW HITACHI

Hitachi's first Super Home Com packed with features that lea others ga
In fact you need to see it to beli

Hitachi S1	- $9
Colour Monitor R6B Vision II	- $5
High Res Green or Amber Monitor	- $1
Single DS/DD Disk Drive 320K formatted	- $6
Dual DS/DD Disk Drive	- $1,0
64K RAM Card expandable on Board to 512K	- $1

is Apples®
puter Center

PLE DEALER

APPLE MACINTOSH
Bob's Computer Center put you in touch with
Computer you don't have to study to learn.
e inch high resolution display
t in Disk Drive
K RAM
Apple Mouse

WARE
Write and MacPaint
40

WARE
ple Works
ster Type
esta "Chess"
50. You save $500!

ALL PRICES INCLUDE TAX

K Total RAM standard
Total ROM standard
pandable to 1 Megabyte
a Reliable Hitachi Quality
h Resolution Graphics
x 20 16 colours
x 400 1 colour
h Level Basic Commands such as
w window
a Fast (Ask for our Bench Mask Tests)
s all Peach Software (Twice as fast)
s Standard Flex operating system
ro Soft Basic
ny other features (please phone or
d for more details)

S1

COMPUTER CENTER

295 Thomas Street, Dandenong 3175
Phone (03) 791 2900

DG printer, and change the mode of the IBM display emulator. To change the speed or the protocols of the RS232 lines, you just type something like MODE COM1:1200,N,8,1. This changes the first RS232 port to 1200 baud, no parity, eight data bits, and one stop bit.

One area in which the DG One differs from the IBM PC in terms of hardware is that while the PC uses a parallel printer port, the DG One uses one of the RS232 ports. This might cause problems when IBM applications look for the parallel port and can't find it, but DG has put a patch in the BIOS redirecting all output to COM2 to avoid difficulty.

If you're using the optional thermal printer, you can change its print quality from draft to near-letter quality using the MODE command. For near-letter quality you type 'MODE LTP1:NLQ'. The final use of the MODE command is to change the IBM display emulation. Different IBM applications packages are written for different IBM video adaptors, but the DG One can emulate both the IBM monochrome adaptor and the colour graphics adaptor. To change the emulation you type MODE followed by either MONO, 40, 80, BW40, BW80, CO40 or CO80. All the values for mode are reset when you re-boot the system, so it's best to set the default to the most common screen mode and use a batch file calling the correct mode for non-standard application programs.

The DG One is shipped with two configuration files called VDISK.COM and ANSI.SYS. If the user wishes he can call these as entries in CONFIG.SYS to alter the mode of operation of the DG One. VDISK.COM is becoming more common as MS-DOS machines are shipped with more RAM. It allows users to set aside a portion of RAM as a RAMDisk, and on the DG One was accessed as drive C.

ANSI.SYS is a screen device driver which configures the system to respond to ANSI control codes. In this mode, the screen and keyboard respond to the same escape codes as a DEC VT100 terminal.

The final utility allows it to be connected to DG's CEO (Comprehensive Electronic Office) office automation system. As well as allowing access to all the facilities of CEO, it can translate files produced by certain common micro applications such as WordStar and Multiplan and transmit them to and from the CEO system, but as I didn't have access to a CEO system I couldn't try this out.

have to be done professionally.

The third option, if you already have an IBM PC, is to link the two machines together and download software to the RS232 line. DG's preferred communications system is DGBlast which, in theory, allows you to upload and download program and text files. In practice, while my Olivetti M24 would talk to the DG One, the DG One refused to say anything to the Olivetti.

In the old days communciations programs were complicated and very unfriendly to use. Recently, however, much more user-friendly programs have been released which make life much easier. My favourite at the moment is Perfect Link for the IBM PC. Unfortunately, DGBlast belongs to the old school and is not to be taken lightly.

'while the PC uses a parallel printer port, the DG One uses one of the RS232 ports. This might cause problems when IBM applications look for the parallel port and can't find it, but DG has put a patch in the BIOS redirecting all output to COM2 to avoid difficulty.'

Applications software

Because the DG One is software compatible with the IBM PC, there shouldn't be a shortage of applications software to run on it. There will always be one or two packages which don't work, but the majority of popular applications, including Lotus 1-2-3 and Multiplan, are already available.

The major problem is likely to be working out how to get the software onto the 3½in disks. DG is arranging to move IBM applications onto these drives.

An alternative is to buy the optional 5¼in IBM compatible external disk drive, which reads IBM disks so that programs can be copied across to the internal disks. The only problem here is going to be copy protected disks, which will

Documentation

Two manuals were supplied with the machine — one was small, the other was very small. The first was the DG One owner's manual, and contained everything you need to know to enable you to set up the machine, use the ROM utilities, and run MS-DOS. Packaged in a spiral-bound typeset form with good use of illustrations, it's relatively low-level and easy to understand.

The second manual was a cut-down pocket quick reference version of the first, which I found quite useful.

Conclusion

I always said that I wouldn't buy a lapheld until it had a 25-line screen, disk drives

Technical specifications

Processor:	80C88
ROM:	32k
RAM:	128k up to 512k
Mass storage:	Up to two 3½in 720k internal disk drives plus one 5¼in IBM compatible external drive
Keyboard:	79-key full travel
Size:	35 x 30 x 7 cms
Weight:	Four to five and a half kilograms
I/O:	Two RS232 ports, system expansion bus
DOS:	MS-DOS version 2.11, CP/M-86
Bundled software:	ROM-based terminal emulator plus editor
Peripherals:	Optional printer and IBM expansion chassis/5¼in disk drive
Modem:	Optional internal modem
Power:	240-volt AC or battery
Battery:	Eight to ten hours continuous use

Benchmarks

BM1	1.6
BM2	5.4
BM3	12.9
BM4	12.3
BM5	13.8
BM6	25.2
BM7	39.5
BM8	39.1

All timings in seconds. For a full listing of the Benchmarks programs, see 'Direct Access'.

UPGRADE OR BUILD

with QT COMPUTER SYSTEMS (AUST) P/L · YOUR OWN COMPUTER

IF YOU WANT TO LEARN ABOUT COMPUTERS OR IF YOU ARE ALREADY AN EXPERT, THERE IS ONLY ONE WAY TO THE FUTURE — BUILD YOUR OWN.

Q.T. Computer Systems have been supporting the hobbiest and educational market for the past four years and now from our own premises at Gladesville, offer a whole range of new products most of which are wholly designed and manufactured in AUSTRALIA.

SUPER 80 ADD—ONS
THE UNIVERSAL FDC

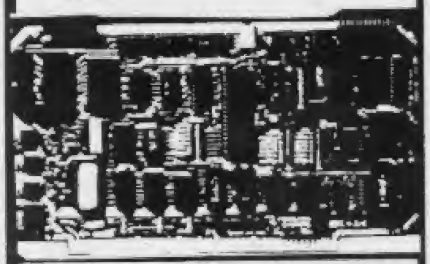
- Can operate up to 4 8" or 5¼" disk drives with any Z80 based computer
- Includes DMA
- Uses WD2793 Controller
- CP/M routines for most popular Z80 systems

SUPER 80 VIDEO BOARD
VDUEB

- 80 x 25 screen format
- Graphics resolution 225 x 560 dot addressable
- Graphics software available

SBC 2/4 CPU BOARD

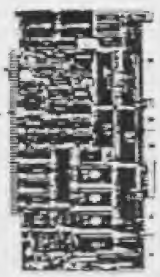
- Z80A CPU
- 2 or 4 Mhz switch selectable
- Two programmable timers
- DMA compatability allows MWRT signal generation on CPU
- Serial port
- Parallel port
- Bareboard kit or assembled & tested



FDC-1 SBC

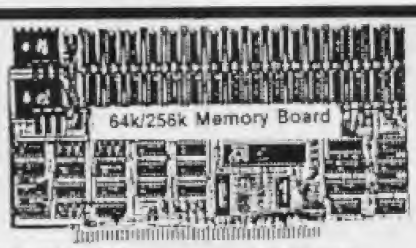
- Z80A 4 Mhz or
- Z80H 8Mhz
- 2 Serial ports
- 2 Parallel ports
- NEC 765 Floppy disk controller
- Up to 8k of Ram or Rom.

Just add memory and you have a complete system capable of a very easy upgrade to multiuser or multiprocessor operation.



5 ¼" and 8" DISK DRIVES

From 150k to 1.6 megabytes of storage. TEAC, MPI, CANNON or YE-DATA, full size or new slimline.
Prices start from $216 plus tax.



MEMORY MANAGEMENT
The memory management circuit allows the memory board to be divided into as many as 16 banks with the following features:

- Each bank is made up to 4k byte segments that can be individually enabled or disabled.
- The size of each bank can be varied in increments of 4k bytes.
- Each bank can be located on any 4k boundary
- There are on-board jumpers that select which banks are enabled or disabled during system RESET.
- The PHANTOM signal disables output of data from the memory board.

MEMORY SIZE
16k to 256k bytes.

MEMORY DEVICES
May use any of the following

- 4116 (200nS 16k x 1 bit dynamic memories.)
- 4516 (200nS + 5V only 16k x 1 bit dynamic memories.)
- 4164 (200nS +5V only 64k x 1 bit dynamic memories.)

SPEED
Guaranteed to operate at 4MHz with no wait states. (Will operate at 8MHz with one wait state.)

Conduct your CP/M with more power than ever before!

- MDRIVE — ADD AN EXTRA DISK, FASTER THAN HARD DISK
- CACHE Q
- CP/M 3.0
- 8 MHz CPU UPGRADE
- MICROSHELL
- JRT PASCAL 3.0
- CP/M USER GROUP LIBRARY
- ACCOUNTING SOFTWARE IN SOURCE CODE
- PCB DESIGN SOFTWARE FOR CP/M

ADD-ONS AND UPGRADES GALORE

MOTHERBOARDS

Q.T. S100 motherboards have become one of the most tried and proven m/boards on the market today, even our competitors use our motherboards in their systems. 4, 6, 8, and 12 slot available.

CARD CAGES

Our strong aluminium frames are ready to accept card guides and motherboards. Perfect for Industrial control applications and for building your own System.

CABLES

If you would rather not make your own cables, Q.T. can fill all your cabling requirements. For disk drives, printers or special application.

DISK CABINETS

House your floppy disk or hard disk drives in our handsome metal cabinets with rugged power supply. Suits 1 or 2 x 8 or 1 or 2 x 5¼ inch disk drives.

HARD DISK SUBSYSTEMS
(THE SOLUTION)

Reliability and expansion capability are the best words to describe our solution to your storage needs. Most Z80 based or Apple computers can be upgraded to hard disk at a cost too low to advertise.
Hard disks and controllers available separately for you to "do your own thing".

MAINFRAMES

Q.T. mainframe cabinets, we believe are the most versatile on the market today. They will accomodate 4,6,8 or 12 slot motherboards, 5¼" or 8" disk drives as well as up to 2 x 5¼" hard disks. Just add your S100 boards, a terminal and you have an inexpensive high quality computer.

DEALER ENQUIRIES WELCOME

FREE MODEM "HOT LINE" MEMBERSHIP
Fast overnight airmail delivery cost $1.00 p/kilo (min $5.00)

We offer generous discounts for clubs, user groups and educational institutions. Call for details.
Choose from one of the most extensive ranges of software in Australia. Too many to list. Phone us with your requirements.

QT COMPUTER SYSTEMS

Phone
(02) 896 104
(02) 816 404

and would work off batteries. I will now add another condition . . . 'and I can afford it'.

Low-power technology is still expensive. If it weren't, the pile-'em-high-and-sell-'em-cheap merchants would be using it.

For an expensive machine the DG One feels cheap. It's certainly nowhere near as well engineered as its major competitor, the HP110.

Apart from the price performance ratio, I have no qualms about the machine. It works well and the package of screen, disks and battery power is just fine. Choosing between the DG One and the HP110 is a difficult decision; if Hewlett Packard built a machine to this specification I'd be ecstatic.

The marketing aim is to poach desktop business. People who use a desktop use the machine for more prolonged periods than people on the go with a lapheld. Given this assumption, I expect a desktop to have a good, easy to read display and a nice keyboard. The display and keyboard on the DG One are fine for occasional use, but I'd hate to spend seven hours a day looking at the LCD screen and using that keyboard.

For anyone who wants a go-anywhere machine that can run IBM PC software, and can afford it, this is a fine machine. I'll wait until CMOS becomes cheaper.

In perspective

The marketing people at Data General are trying to be clever with this product. Its obvious market is as a go-anywhere, full-function portable which can be run off batteries and carried in a briefcase.

However, by offering the external IBM compatible disk drive and expansion units, the marketing men are hoping to poach some business from the desktop market. Although great things are forecast for the lapheld market, the real business at the moment is still with desktops. Data General hopes to sell very large numbers of this machine, and to do so they need to be in as many sectors of the market as possible.

At the portable level, the DG One's main competition is from the Hewlett Packard HP110, which beats the DG One on engineering, user-friendliness and style. The DG One has a bigger screen and built-in disk drives.

Prices

The basic system with 128k of RAM, one 720k diskette and AC adaptor will cost you $5,200. The expanded version with 512k of RAM and two disk drives is $8,800 (including sales tax).

Just as this issue was about to go to press, Data General informed us that the 'One' to go on sale in Australia later this month will be blessed with an LCD screen with improved intensity and contrast. So if Peter Bright's comments regarding the screen have dampened your enthusiasm for the machine, I suggest you call Data General when the One becomes available and arrange to see the new screen for yourself.

The first machines to go on sale in Australia will not have the internal modem as it has not yet been approved by Telecom. When it is, existing users will have the option of having one fitted. — Ed.

Talking toys

If mastery of the qwerty keyboard is an insurmountable problem, give up and try a computer with speech recognition/synthesis capability. Martin Banks advocates speech, the oldest form of communication, as a viable and impressive alternative to hours of frustration and knotted fingers.

Once upon a long, dim, distant time there were two hairy sort of persons who stood facing each other, scowling. They stood like this for some time until one, enraged beyond containment, let forth a strange growling sound which scared the other so much that it ran off.

The essence of communication had been discovered, as had its value. From that point the human race has developed to the stage where it has produced a number of different ways of communicating to complement that first form, vocalisation. One of the most important of these has been the development of the written word and, from that, the development of the machines that help humans create the words more easily: stone tablets, pens, paper, pencils and the typewriter.

This last one brought with it one of those inventions that is, at one and the same time, both incredibly clever and a pain in the . . . That invention is the keyboard. The qwerty keyboard is the bain of many people's lives, especially as it has been universally adopted as the standard form of input device for the computer. The technical reasons for doing this are quite sound and when the computer was a machine that was only used by trained personnel (either operators and programmers or typist-oriented key entry staff), the fact that the keyboard was being used didn't matter too much.

While the keyboard was being used exclusively by those explicitly trained in such arts, intimidation did not matter. Now it's different. Personal computers are everywhere. Workshop foremen use them, children use them, senior company executives use them. The intimidatory value of the keyboard has therefore become rather more significant.

A way around the keyboard was needed and over the last year or so technology has come up with some answers. The mouse is probably the most famous so far and, as far as it goes, is an excellent tool for moving the cursor around and entering simple commands by pressing. (Sorry, but it still has keys.)

Another device that has been employed of late is the touch-sensitive screen. This is actually a misnomer, for the thing is light-sensitive not touch-sensitive but, despite such split hairs, it allows the user to point to locations on the screen with a finger or similar apparatus and identify tasks, functions, windows or whatever is required. Again this is fine as a means of imparting simple instructions to the computer quickly and in a form that the user can readily comprehend.

Now, however, technology has come up with that which has long been predicted — the form of communications for which humans are rightly famous. Yes, folks, the babbling computer has arrived. There are, to be fair, several add-on units that can be bought for the most popular personal computers which offer some degree of speech recognition and synthesis capability. But one of the first to come from a major manufacturer, to my knowledge at least, is the latest variant of the Texas Instruments Professional Computer.

TI has been in the speech technology business for some time, having produced such famous toys as the Speak'n'Spell educational unit. It also produced a speech synthesis add-on for its now defunct TI99/4A. These, it must be said, are just kids' stuff to what is now available. TI has produced a $3000 add-on board for its hard disk variant of the machine which really does have some interesting possibilities, and which could become the next generation of executive status symbol.

Early versions of the speech synthesis system tended to work only with small amounts of verbosity, and the digitised data for this was normally held in PROM on the same board as the speech processor. To limit the capacity further, the actual spoken sentences were constructed from individual words and phrases rather than long word strings. This meant that the recorded voice used in the first place had to be flat and uninteresting due to any intonation inevitably making a constructed sentence sound odd.

The TI system can now record a voice with any necessary intonation directly onto disk. It can then be read back for synthesis. On a 320k floppy, for example, TI claims it can record 20 minutes of continuous speech which can, as is the way with synthesis systems, be speeded up or slowed down without pitch changes as required. That may seem like a novelty but it has some uses.

The speech recognition system can identify some 50 different words in up to nine different vocabularies (that is, different individual voices). TI has produced a routine that allows the user to construct a file of commands which simulate the command keystrokes of any application program. Therefore it becomes possible to have the computer recognise you saying an application program command, 'scroll down' for example, and execute that command.

For a large number of applications this capability will allow quite a reasonable measure of 'hands-free' computing. With a spreadsheet, for example, it will be possible to have all the key commands and numeric data entry 'keystrokes' as spoken commands. Imagine it — the executive's status machine. You will sit at your desk and blithely say something like: 'Cell A4. 47321 point 68 return. Calculate.' The computer, with the right programming, will not only do the requested job but could also obsequiously mutter 'I hear and obey, oh Master.'

TI has introduced, at the same time as the speech system, a networking capability with all the usual bells and whistles including an electronic mail facility. It doesn't take too much thought to see that it should be possible to combine speech with electronic mail — after all, the digitised speech is just another disk file which can be squirted around the network.

Here is the ultimate executive's toy. Send someone a text document and append to it a speech file with myriad words of comfort, clarification, excuse, and so on. This could have some really interesting possibilities.

SAMPLE THE POWER OF FRAMEWORK ASHTON·TATE

ON YOUR OWN COMPUTER!

FOR $19.95!

Sample Software.

2-DISK SET. For your IBM PC, PC XT or Compatible!

Sample Software is an exciting new concept in Software evaluation, supported by the major software houses! Sample Software – it's the perfect chance to try before you buy!

DISCOVER FRAMEWORK – the most exciting and powerful integrated software program recently released! Requires 384K RAM. Integrates WORD PROCESSING, SPREAD SHEETS, DATA BASE – AND WINDOWING – PLUS GRAPHICS, COMMUNICATIONS – ALL IN THE ONE PACKAGE!

OTHER SAMPLES AVAILABLE NOW!

APPLE II: MEC Education, Hypergraphics.

MS-DOS: Martin's Marvellous Public Domain Software.

CP/M: Bill's Bonanza – Best of the Public Domain Software (Specify Disk Size and Format when ordering).

PLUS! THESE LATEST-RELEASE PC-DOS SAMPLES:
dBase III, RBase, SuperCalc 3, Symphony, Attache Accounting, Energraphics (specify IBM, PC-XT, Columbia or PC-Compatible), Friday!, DR Graph, DR Draw.

FREE VOUCHER OFFER

Every Sample Software Order entitles you to a GIFT VOUCHER OF EQUIVALENT VALUE – redeemable with your chosen full-price software purchase.

These sample programs show you at firsthand the real power of the very latest Microcomputer software releases – on your own computer – at a fraction of the full price! However, each sample deliberately limits the extent to which you can make use of it, while still providing utilisation of most of the key features in the full price software!

Sample Software.

"TRY BEFORE YOU BUY!"

PROMPT & SAFE DELIVERY GUARANTEED!

Yes please, I would like to sample THE FRAMEWORK 2-DISK SET @ $19.95! TOTAL ORDERS: ☐ @ $_____ PLUS $1.50 P&P.

I would also like to order @ just $11.95 each:

APPLE II: ☐ MEC Education; ☐ Hypergraphics.

MS-DOS: ☐ Martin's Marvellous Public Domain Software.

CP/M: ☐ Bill's Bonanza – Best of the Public Domain Software. (Specify Disk Size and Format).

PC-DOS: ☐ dBase III; ☐ RBase; ☐ SuperCalc 3; ☐ Symphony; ☐ Attache Accounting; ☐ Energraphics (specify IBM, PC-XT, Compatible); ☐ Friday!, ☐ DR Graph; ☐ DR Draw.

My Computer is: _____

Specify Operating System, Disk Size and Format.

_____

OR, I am planning to purchase _____

I would like to receive more information on:

I enclose ☐ Cheque, ☐ Bankcard; ☐ Mastercard.

Card No: _____ Expiry: _____

NAME: _____

COMPANY: _____

ADDRESS: _____

_____

P/CODE: _____ TEL: ( ) _____

NO STAMP NEEDED! SEND TO:

Sample Software,
Free Post 18, PO Box 169,
DARLINGHURST NSW 2010.
OR TELEPHONE: (02) 357 2109

Sample Software.

THE ADVERTISING AGENCY MS 238

Spoilt for choice

Mike Liardet guides the prospective spreadsheet buyer through the bewildering choice of available systems, and gives hints on what, and how, to choose.

A couple of years ago spreadsheets were still something of a rarity. In those days there was VisiCalc — the world's first spreadsheet program, and a handful of early imitators. Whereas the would-be database or word processor user could look down a long list of products before making a selection, the budding spreadsheet user was invariably faced with Hobson's choice or, worse still, no choice at all.

A couple of years is a long time in the world of micros, and the situation is quite different today. Most of the major software suppliers, together with a host of newcomers, have plugged this gap in the market. All personal computer users, from the humble Commodore 64 to the world-beating IBM PC, can mull over the pros and cons of a wide range of spreadsheet software.

Paradoxically, this has made the situation more difficult since most prospective spreadsheet purchasers can easily become confused by the myriad claims and counter-claims of rival products.

History

Unlike most micro software, spreadsheets have no mainframe ancestry: they only became feasible with the advent of machines with cheap processor power and high-speed displays, otherwise known as micros.

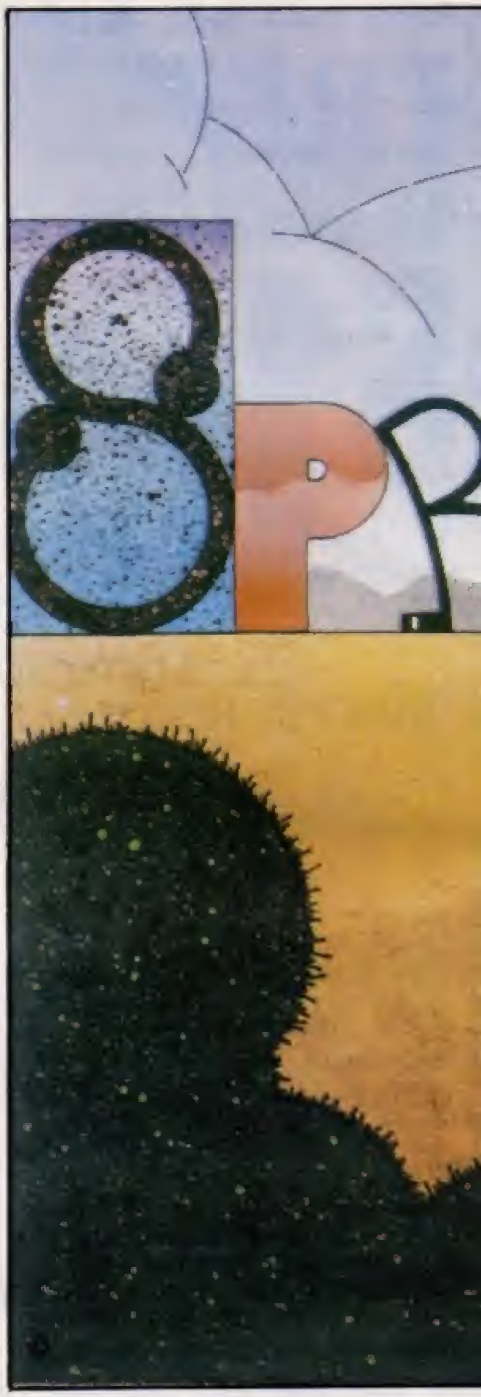
The spreadsheet appeared as recently as the late seventies by courtesy of two young Harvard Business School graduates, Dan Bricklin and Bob Frankston. Their program, called VisiCalc, was an instant success. Unfortunately (for them) they were unable to copyright or patent the spreadsheet concept, and in the intervening years a wide range of rival companies launched their own spreadsheet systems.

Today the spreadsheet is widely recognised as one of the software cornerstones for personal computing, along with word processing, database and graphics. Since many micro users need more than one of these fundamental packages, a number of manufacturers have attempted to combine them in one 'integrated system'. The theory is that a single integrated package is cheaper and easier to learn, with benefits becoming apparent when data needs to be transferred from one type of application to another (for example, spreadsheet results to generate a graphics display).

Much of the more recent spreadsheet software does not exist as a stand-alone package, but is just one of five or six applications in an integrated system. It has yet to be demonstrated that the public really does want this type of mega-software, but the success of graphics-spreadsheet integration (in the form of Lotus 1-2-3) is undeniable.

What is a spreadsheet?

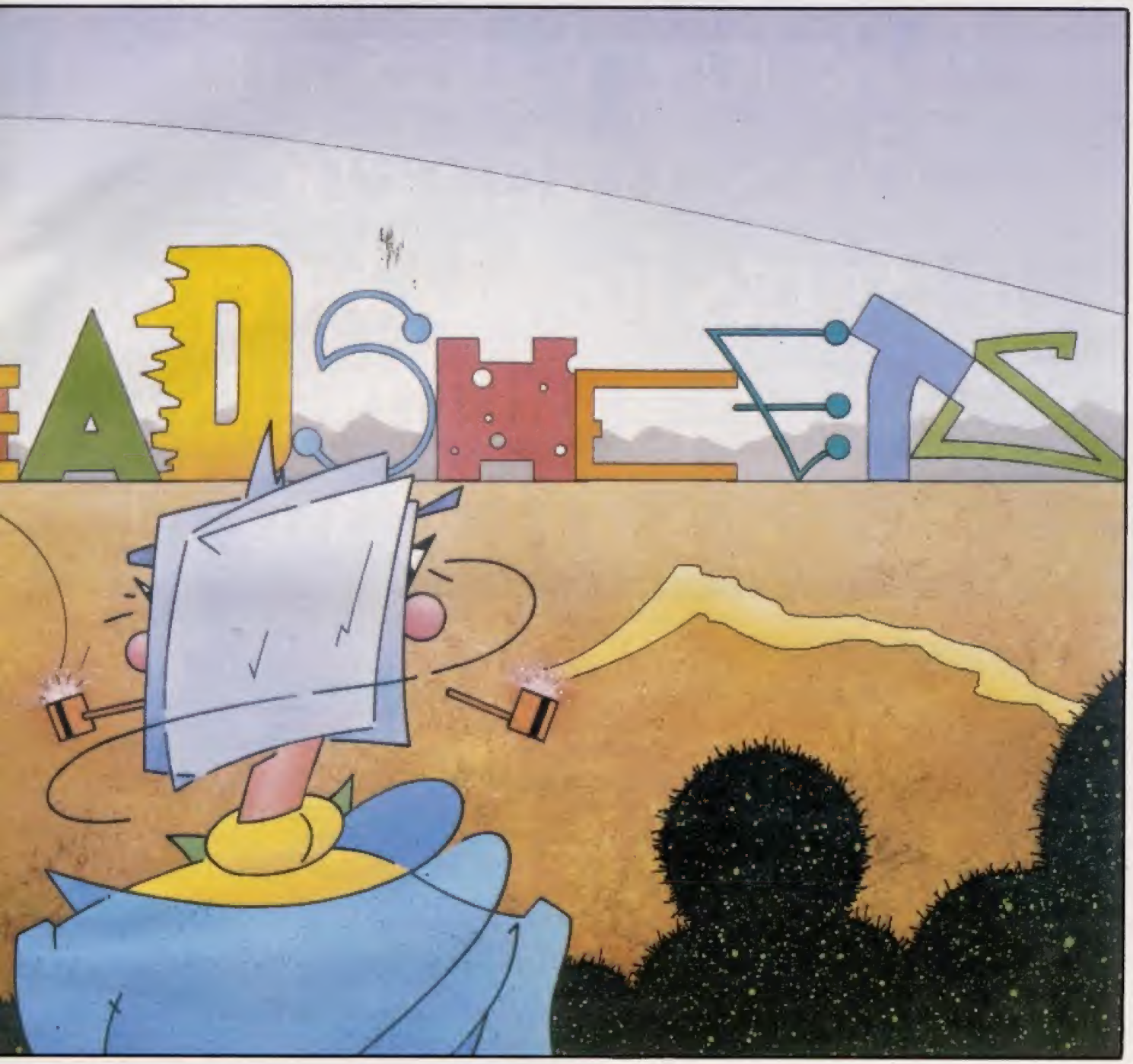
When a spreadsheet system is running, the VDU screen acts like a window on a large sheet of numbers interspersed with text headings, neatly laid out in rows and columns. As the sheet is much larger than the screen, only a part of it can be shown at any one time.



The spreadsheet rows are usually numbered and the columns identified by letters, so the coordinates of any cell can be ascertained; for example, the top left-hand cell is at A1, whereas Z99 will be further down and to the right.

A single cell is marked by the cursor, and is highlighted or distinguished in some way. By using a few keystrokes it's possible to shift the cursor to a new cell. Attempts to move the cursor off the edge of the screen cause a rapid redraw so that its destination can be displayed. If the redraw is fast enough, it's as though the window has been 'pulled' into a new position by the cursor.

At the cursor it's possible to enter text, a number or formula. A typical formula could be A1 — 10 * C2. If the values displayed at A1 and C2 are 76.5 and 6.7,



this will cause the cell containing that formula to display 9.5. In practice, formulae can be very complex calculations using a variety of maths functions and referring to many other positions on the sheet. The result of a formula's calculation is displayed immediately the formula is entered, but if a change is subsequently made at a position referred to by the formula (at A1 or C2 in the example), then a recalculation is made automatically so that the display remains consistent. This recalculation can have a knock-on effect to other formulae, which must also be recalculated, and so on. Frequently, an alteration on the top line of a spreadsheet can change everything from top to bottom.

Fast, automatic recalculation is the whole *raison d'etre* of spreadsheets: the equivalent exercise on paper might take several hours, even using a calculator. A spreadsheet saves time and produces error-free results (assuming the correct formulae have been used), which in turn encourages more experimentation with figures, or 'what-if' analysis, as it is termed.

The classic spreadsheet implementation is in financial planning, where 12 columns are used to represent the 12 months and the rows are used for profits, sales, overheads, and so on. But spreadsheets can also be useful as a laboratory tool, for statisticians, or in any area demanding repetitive calculator work. 'What-if' analysis can be especially useful in financial planning, where there's no certainty about the future, and a range of possibilities can be quickly explored; for example, effect on profits if next year's sales are good, average or bad. Once a set of formulae have been built up in a spreadsheet, it's easy to experiment with a range of possible scenarios, as the recalculation effort can be performed quickly and accurately by the computer.

Requirements

To distinguish between a good and bad spreadsheet, you'll need a clear idea of your requirements. Most spreadsheet software will only run on a limited range of machines (IBM PC, CP/M systems, Apple II, and so on), so your choice will immediately be limited by the available hardware. You may insist on graphics or a link with other software, which will

It Reads, Writes and does Arithmetic. It Paints in 3-D, Keeps Your Appointments and Talks to the World.

OPEN ACCESS is now available for the following MS DOS/PC microcomputers:

AT&T PC; Chamellion; Columbia; Compaq; Corona; Data General; DEC Rainbow; Eagle; Emtek; Ericsson; Friend; HP-150; Hyperion; IBM PC; ITT Extra; Monroe; NCR Decision Mate V; NEC-APC IIIOlivetti M24; Pantek; Philips PC; President; Sigma Elite; Sperry PC; Tandy 2000; TeleVideo; Texas Instruments PC; Toshiba T-300; Wang PC; and Zenith 150.

O·P·E·N ACCESS

"OPEN ACCESS," is the result of 60 man-years of effort to create a truly do-it-all, super-program — one that can perform virtually every task you're ever likely to encounter.

The beauty of it is, all that capability resides on a single program. You don't have to re-enter data. Or spend time trying to get unmatched programs to work together.

OPEN ACCESS takes its name from the source of its power — a relational data-base manager that gives you access to more data in more ways than any comparable software.

OPEN ACCESS includes an electronic spreadsheet, 3-D graphics, word processor, appointment scheduler and telecommunications module — all revolving around the powerful information manager.

For your nearest dealer contact the Australian distributor...

SOFTWARE SUPPLIERS

7 Avon Road
North Ryde, NSW 2113
Telephone (02) 888 1955
Telex AA 75364

further limit the choice. There's also a major division between pure spreadsheet software and financial planning systems (based on older mainframe interactive techniques) which incorporate only some spreadsheet facilities.

When you have narrowed down the field, a demonstration of the more likely candidates is desirable to give you a chance to see the system's key features in action. Study the documentation and look for simplicity of style.

A popular approach is for documentation to be divided into tutorial and reference material. The tutorial sections should be readable and lightly entertaining; some of the later spreadsheet systems have tutorial material built into the software and you may prefer to learn this way. The reference material should provide the answers to fairly detailed questions that might arise once you are fimiliar with the basics. For example, whether the trig functions work with radians or degrees, or how to switch off automatic recalculation. The spreadsheet should be well-indexed for quick reference.

The most common problem encountered by spreadsheet users is lack of memory. A typical system might claim to handle a spreadsheet of, say, 256 rows by 64 columns, but run out of memory long before all 16,000 cells have been used. Spreadsheet size is limited by the amount of available RAM in the machine, thus 16-bit micros can accommodate larger spreadsheets than older 8-bit micros.

Once models become very large, the recalculation time, following a modification, becomes significant. To avoid irritating pauses after every modification, it's useful to be able to switch off the automatic recalculation facility: the faster calculations can be performed, the better.

Apart from the basics (documentation, reliability, speed and size), most spreadsheet systems differ from one another with respect to the facilities they offer. Generally, users only require a few available facilities, and here are the major options:

Integrated software: if the system is, or can be, integrated with graphics software, it's a definite bonus.

Maths function: everyone needs plus, minus, times and divide, but some may need trig and logs, and other advanced maths functions. Statistics and special spreadsheet functions (like row-sum, or minimum value in a column) are also very useful.

Spreadsheet editing: most systems offer special facilities for inserting or deleting rows and columns, or editing formulae. It's particularly important that a good replication facility is provided. This will enable a model to be developed for just one column and quickly copied across several — which saves a considerable amount of typing.

Display facilities: there are a number of possible enhancements to a basic spreadsheet display — multiple windows, where the screen can window on two or more areas of the spreadsheet, variable column widths, and so on. It's possible to manage without these facilities, but they are useful in certain spreadsheeting methods.

Sorting: some applications need data to be sorted, and there are spreadsheet systems to provide this facility. For some applications (ranking students' exam results, for example), it's important that the sorting not only affects the column being sorted, but that data in other columns is moved simultaneously as a result.

Consolidation: if an organisation is split into several divisions, it's often necessary to sum key data into one global report — this is consolidation.

Goal seeking: you know which result you want — but how do you get it? Goal seeking enables you to reverse the normal logic flow in your model. For example, what sales (at the top of the model) will give a specified profit (at the bottom)?

Sensitivity analysis: say, you've formed a reasonably plausible plan, but how drastically will it change if some of your assumptions (for example, next year's inflation rate) are wrong? Sensitivity analysis shows how sensitive the plan is to variations from your initial guesses.

Programmability: if you're already a programmer, you might appreciate the ability to use the spreadsheet as a rather novel programming language. Unless you're a *very* sophisticated user, you're unlikely to want to stray into this territory.

Home computer systems

It's naive to expect a $400 home computer to support serious business applications. Principally, home computers lack fast, reliable permanent storage facilities and have a reduced display capacity, which rules out any serious use of database, word processing or accounting systems.

But spreadsheet software does not make high demands on permanent storage facilities. Once the spreadsheet software and a saved model have been loaded, all further manipulation affects only the internal memory of the machine. As a home computer's internal memory

Product name	*Tested on*	*Max Rows*	*Max Cols*	*Capacity # rows*	*Recalc rows/sec*	*Scroll rows/sec*	*Scroll cols/sec*	*Text # rows*	*Numbers # rows*
Abacus*	Sinclair QL 128k	256	64	56	2.8	2.5	2.0	58	57
Falc	Sord M5	100	100			6.0	4.0	34	30
Framework	IBM PC 512k RAM				2.08	1.6	2.2		
Multiplan	Apple II 64k RAM	255	63	95	1.58	6.0	4.0	190	190
	Sirius 128k RAM	255	63	235	4.27	6.0	4.0		
PerfectCalc	56k CP/M 2MHz Z80	255	52		0.30				
PlanStar	IBM PC 256k RAM	5000	5000		0.16	2.0	1.3		
Symphony	IBM PC 458k RAM	8192	256	247	7.48	3.6	1.9	820	967
VisiCalc	Apple II 64k RAM	255	63	82	1.91	10.0	6.0	148	254
	+ 128k RAM	255	63	320	1.81	1.3	2.5	large	large
Vu-calc	Spectrum 48k RAM	60	60	240	1.00	4.0	3.0	240	240
1-2-3	IBM PC 320k RAM	2048	256	370	6.85	6.3	3.8	1210	1380

* Note that Abacus was tested on the Sinclair QL (at the time of its release) and has not been tested on the ComputerPhone as Telecom did not have a machine available as at the time of going to press.

Fig 1 Benchtest results

AMUST GO

DUE TO MARKET DEMANDS, AMUST GOES RETAIL

Printers — Dot Matrix

		Normal Retail	Our Price
Amust DT-80/2;	100 cps; Trac/Frix; 2.5 million Char. ribbon; Exc. Graphics; Serial/ Parallel	$ 399.00	$ 249.50
Amust DT-100	100 cps; 10/12 Pitch Almost letter quality (over 6000 sold in Australia)	$ 329.00	$ 275.00
Amust P88-2	120 cps with 24 cps Near Letter Quality; Unique 3 position switch selectable print	$ 379.00	$ 325.00
Mitsui MC2100	120 cps/NLQ; 4000 hour MTBF reliability; Trac/Frix	$ 599.00	$ 350.00
C. Itoh 155ORE	132 column; 120 cps **Dual ports**; limited quantity OR	$ 995.00	$ 695.00
C. Itoh 1550 SP/SR	*New* 180 cps; 132 col Serial or Parallel	$1395.00	$ 995.00

Printers — Daisy Wheel

TEC F10-55	New superb quality 55 cps (including wordstar)	$2695.00	$1895.00

Monitors

Amust GR-1	Hi-Res Green by **Mitsubishi**; Latest style	$ 179.00	$ 130.00
Amust GR-2	Extra HiRes (20 Mhz) Green **by Taxan**; Latest Model	$ 245.00	$ 150.00
Amust AM-1	Extra HiRes Amber **by Taxan**; Latest Model	$ 260.00	$ 160.00
Vision PC	Kaga Denshi IBM Colour Compatible; 640 x 262	$ 775.00	$ 575.00
Mon Stand	Full Tilt Monitor Stand	$ 49.00	*$ 25.00

ES DIRECT

Stop Press! Look for news of our new showroom opening — Feb. APC

Liquidation Items!

Due to one of our dealers failing, we offer AT OR BELOW COST

	Our Price	Rec Retail
Disc Drives		
National/Matsushita JA551 40 track	$ 149.50	$ 259.00
National/Matsushita JA561 80 track (1.2 MB)	$ 169.50	$ 349.00
National/Matsushita JU581 80 track (1.6 MB)	$ 199.00	$ 399.00
Atlas-8 — Apple Slimline by National	$ 140.00	$ 299.00
Ribbons		
DT80/DT100 — Ribbons for Amust DT80/100 & BMC80, CP80, Visa80, SP80	$ 13.95	$ 7.50
Typewriter/Printers		
Amust PD113 — Electronic daisy wheel typewriter with one line memory erasor. All latest features	$ 399.00	$ 599.00

IN A WORLD OF UNCERTAINTY, THE CORRECT DECISION IS AMUST.

Amust COMPUTER CORP.

* MAIL YOUR COUPON — PHONE — CALL-IN — DEALERS *STILL* WELCOME

ALL PRICES ARE EX SALES TAX

TO: Amust Computer Corp. P/L
350 South Rd, Moorabbin 3189, Vic.
Ph: (03) 555 3644. Tlx: AA34663 AMUST

Delivery per Airfreight $7.00 per 10 kilos AUSTRALIA WIDE
Local Melbourne $2.00 per 10 kilos

BANKCARD, VISA, AMEX, — ALL WELCOME

Please send me .....

.....

.....

☐ Enclosed is my Cheque or Money Order for $ .....
or please charge my Credit Card Indicated

☐ BANKCARD ☐ AMERICAN EXPRESS
☐ VISA ☐ ALL WELCOME

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date ..... Signature .....

NAME ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

ADDRESS ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

CITY/SUBURB ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

STATE ☐☐☐☐☐☐☐☐☐☐☐☐ POSTCODE ☐☐☐☐

TELEPHONE NO ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

and processor are identical to that of many business micros, spreadsheet performance should not be seriously downgraded on a home computer. Of course, loading and saving models to cassette tape does take longer, but this is only done occasionally during an average spreadsheet session.

Spreadsheet software for home computers includes Calc-Result for the Commodore 64, Falc for the Sord M5 (tested in the February '84 issue of *APC*), Vu-Calc for the Sinclair Spectrum and Abacus for Telecom's ComputerPhone. Abacus has been included in this home computer category as it was originally designed for the Sinclair QL, a top of the range home computer shortly to make its way to Australia (though not through official distributor channels).

Abacus is in a class of its own in this end of the market. It is included in the ComputerPhone's price along with three other packages (graphics, database and word processing). The four packages can exchange data between each other but must be run separately. It might be of interest to prospective ComputerPhone owners that Psion, the author of these packages, has also made them available for MS-DOS machines.

Integrated systems

Following the enormous success of Lotus 1-2-3, an integrated spreadsheet-graphics-database which deposed VisiCalc as the leading spreadsheet system, several integrated systems have been released in the last year.

It should be remembered that most integrated systems are not strictly spreadsheets at all, but provide a highly sophisticated and versatile software environment that can resemble a spreadsheet, a word processor or a database as the need arises (1-2-3 is an exception).

Lotus 1-2-3 was originally available solely for the IBM PC, but is slowly migrating onto other MS-DOS machines. The 1-2-3 environment is primarily a spreadsheet, and the database facility is accommodated when rows of the spreadsheet are used to represent records with the columns being the fields. 1-2-3 has various sort and selection facilities to provide a crude but effective facility for handling small databases arranged in this manner. Its main selling points are its superb spreadsheet and graphics facilities, providing very fast calculations, plus pie charts and bar graphs.

Ashton-Tate, developers of dBase II, launched Framework as a rival to Lotus 1-2-3. Framework fully integrates spreadsheets, graphics, databases, word processing, ideas processing and communications. Each application type is held in a 'frame', of which there can be several of the same type. This means that several spreadsheet applications can be active at one time. If it's a spreadsheet frame it acts as a window on the spreadsheet in the normal way. All the frames can access each other's data, so data in a frame can be used to draw graphs in a graphics frame, or several spreadsheets can be totalled into a 'consolidation frame'. It's also possible to program Framework so that highly complex spreadsheet manipulations can be performed at the touch of a button.

Having produced 1-2-3, Lotus didn't rest on its laurels but set about improving it. The result was Symphony, an integrated system launched at the same time as Framework, but with a specification so similar that one suspects that both companies were working as hard at market intelligence as at developing the software.

Symphony's user interface is closer to Lotus 1-2-3 than to Framework. All Framework's applications are offered, but the underlying data is stored in one huge spreadsheet which is viewed through different windows (*cf* frames above).

Some of 1-2-3's best features have been transplanted into Symphony — the impressive calculating power and graphics, in particular. But a number of

Name of package	*Producer*	*Issue of* APC
Abacus	Psion	Not tested to-date
Falc	Sord	February 1984
Framework	Ashton-Tate	September 1984
Multiplan	Microsoft	May 1983
PerfectCalc	Perfect Software	November 1983
PlanStar	Micropro	August 1984
Symphony	Lotus	September 1984
Vu-calc	Psion	Not tested to-date
1-2-3	Lotus	December 1983

Fig 2 References

PORTA PAK COMPUTER

...other computers cringe

PortaPak comes with its sleeves rolled up. It was designed in Australia to get the most work done in the least time and at the lowest price.

If you want results, sheer computing power, trouble free performance, then PortaPak is the only choice. If you want prestige, if you need to stroke your corporate ego, we suggest you buy something else. Something that costs more, isn't as powerful but has a lot of "image."

Put PortaPak up against imported machines costing $5000, $6000 even $7000. The other machines cringe with embarrassment.

PortaPak has 800K of formatted space on each disk drive. The expensive machines which boast about having 360K suddenly look rather silly. With PortaPak you'll be able to handle much bigger data files and have far more programs on hand without having to fiddle around changing disks.

Reliability is often thought of in terms of machine breakdowns. Nowadays, the big problem isn't with breakdowns it's with hangups – when your machine turns out to be incompatible with your software. This is an enormous, widespread problem.

It's why we teamed up with Australia's software geniuses – Software Source Pty Ltd, the top suppliers of business and professional programs in the country. First, they specially customized PortaPak's operating system so it works with exceptional speed and simplicity.

Then they customized all their CP/M products to run perfectly on the PortaPak – products like dBASE II, SuperCalc, all the major languages, accounting systems, etc. Most importantly, they stake their reputation that all these products will work without hitches. No other computer in Australia can offer this total software support.

As for electrical and mechanical reliability, look inside a PortaPak. There's a striking difference. The PortaPak is completely modular. We didn't scrimp by putting all the circuits on one board. We use *three*. Servicing is simpler, quicker and cheaper. It's why the leading national computer service company, TCG Pty Ltd, is pleased to offer a 12 month service contract on PortaPak in all capital cities.

Take an extra close look at the Canon disk drives. If Rolls-Royce built computers, they'd use Canon drives. See the massive head protection shield? Hear the way the heads lock away every time they deselect? The designers had an unusual attitude to reliability – fanatical.

Now carry out some speed tests. On a standard benchmark test using BASIC routines*, the timings are: PortaPak 12.9 seconds, IBM PC 16.4 seconds, NEC APC 19.7 seconds and Sirius 16.4 seconds. Using a standard dBASE II routine**, the timings are: PortaPak 8 minutes 11 seconds, IBM PC 11m 52s, Sirius 17m 9s and NEC APC 19m 16s.

The expensive imports really cringe at this because they make so much of being "16-bit" machines. PortaPak is an 8-bit machine and proud of it. Not only is an 8-bit machine inherently better suited to jobs like word processing, accounting, spreadsheets, etc, but the 6MHz clock rate ensures it can run rings around the others even in complicated mathematical tasks.

Now to really rub it in, look at PortaPak's stunning additional features:

- Compact portability. It needs only half the desk space of its nearest rival. It goes with you on business trips, at night, on the weekend. *In one hand, you hold the concentrated working power of an entire office.*
- 9-inch screen, 80-characters wide but with 35 lines instead of 24. You see more of your work and the characters are the normal shape – not elongated. Much more readable.
- 640 x 304 high resolution, dot addressable graphics.
- Free software including Spellbinder word processing and office management system (the most powerful available), EBASIC compiler, MENU to make life easy for new users, MODEM for telephone communications, and Speed Print which lets you continue working while you're printing.
- Universal terminal emulation lets your PortaPak mimic the screen handling of other computers and run the programs installed for them. Your PortaPak can act as a terminal for any computer you care to name.
- Ability to read and write to other 5.25-inch disk formats – e.g. Kaypro and Obsorne. Lets you exchange software directly with owners of different computers.
- User definable character set lets you work with foreign alphabets, scientific symbols, etc.
- Five input/output ports for connecting to printers, modems, etc.
- Wide range of peripherals including 5 and 10 Mbyte hard disks, built-in world modem, RAM drive, EPROM programmer, A/D converter, etc.

Radically different, distinctly Australian design using industry standard software.

Two one-megabyte disk drives – total formatted capacity = 1.6Mb.

Z80B processor running at six megahertz.

9-inch screen, 80 characters by 35 lines 640 x 304 graphics.

Intelligent, capacitive, spill-proof keyboard.

Entire system including software and sales tax – only $3,555!

For the name of your nearest PortaPak dealer contact:
The Portable Computer Co.
80 Beauchamp Rd, Matraville, 2036.
Phone (02) 661 4877. Telex AA71063

*See Australian Personal Computer, Feb., 1984.
**See Australian Micro Computerworld, Nov., 1983.

THE PORTABLE COMPUTER CO.

Cash & Carry Computers & Softwar

IBM

	OUR PRICE	R.R.P.
Perfect Link	129.00	149.00
Crosstalk	249.00	299.00
Prokey	230.00	269.00
Loadcalc	165.00	199.00
AST 5251/12	1195.00	1595.00
Irma	1695.00	1895.00
APL/Plus PC	1045.00	1199.00
Symphony	795.00	995.00
Lotus 123	575.00	745.00
dBase II	460.00	540.00
dBase III	595.00	795.00
dBase II-III	249.00	299.00
Framework	675.00	795.00
Multimate	395.00	595.00
Word Perfect	465.00	650.00
Easywriter	465.00	579.00
Havard Project Manager	545.00	649.00
Graphwriter	845.00	995.00
RBase	530.00	630.00
Clout	215.00	256.00
Wordstar Propak	395.00	795.00
Spell Binder	655.00	695.00
Supercalc 3	367.00	445.00
Corporate MBA	1020.00	1200.00
Open Access	675.00	940.00
Quickcode	300.00	380.00
Flight Simulator	69.95	87.95
Cardbox	279.00	328.00
Ada	360.00	420.00
C-Compiler CP/M86	315.00	385.00
Fortran IV	499.00	578.00
Turbo Pascal	79.95	135.00
Revelation	1499.00	1762.00
Knowledgeman	595.00	895.00
Hercules Graphics	595.00	938.00

FOR ALL SOFTWARE REQUIREMENTS — CALL US NOW FOR SUPER SAVINGS!

AST Sixpack	call	
All T.I. Software	call	
Abstat	599.00	742.00
Stat pac	577.00	637.00
Pascal MT +86	585.00	725.00
Concurrent CP/M 86	508.00	610.00
C-Basic 86	314.00	395.00
Basic Program Tools	295.00	370.00
Personal Pearl	435.00	510.00
Blue Linx SNA Emulation	1445.00	1890.00
Key II — 123	375.00	427.50
BPS Graphics	488.00	562.50
STB Graphics	724.00	867.00
NBI Remington	990.00	1245.00
Jack 2	690.00	770.00
PCOX	1707.00	1895.00
Havard Project Manager	545.00	658.50
Auto Cad	1523.00	1875.00
Micro Cad	876.00	982.00
K-Graph	349.00	510.00
K-Paint	176.00	249.00
Peachtext 5000	547.00	599.00
Peachtree Basic Acc System	Call for a price	

	OUR PRICE	R.R.P.
commodore	Call	Call
KAYPRO	Call	Call
TeleVideo	Call	Call

apple

Apple CED Par	135.00	175.00
Apple CED Ser	125.00	165.00
Microsoft Softcard	422.00	545.00
Digitek Printmaster	138.00	202.00
CP/M + Wordstar + 64K	495.00	595.00
CP/M + Infostar + 64K	566.00	666.00
10 mb Davong for Apple III	2495.00	2898.00
RGB for II+, IIe	142.00	162.00
RGB 80 column for IIe	189.00	234.00
Accelerator II (for II+)	811.00	990.00
Applicard 64K/DOS	565.00	632.00
Applicard 192K with CP/M	835.00	961.00
Polo Serial Card	355.00	388.00
Ultra Term	715.00	806.00
MacCash	245.00	275.00
MacLedger	345.00	385.00
Mainstreet Filer	285.00	320.00
Transylvania	57.95	65.95
MacManager	66.95	75.95
MacPuzzle	57.95	65.95
Mouse Stampede	46.95	54.95
Filevision	235.00	275.00
More Mac Software	Call	Call
Zardaxx	256.00	324.00
Homeword	89.00	99.65
PFS File, Graph, Report	145.00	175.00
dBase II	395.00	540.00
ALD System II	182.00	215.00
Wordstar Propak	595.00	795.00
Uspeed	698.00	897.00
Perfect Writer	175.00	295.00
Beagle Bros Graphics	Call	Call
Nevada Languages	55.95	59.95
Grappler +	165.00	185.00
Turbo Pascal	79.95	135.00
Apple Multiplan	345.00	395.00

MISCELLANEOUS

64K Chips	75.00	95.00
Datalife SSDD(10)	33.00	49.00
Datalife DSDD(10)	39.00	59.00
Paper (2500)	49.00	69.00

MONITORS

Kaga Green IBM	307.00	327.00
Taxan Kaga Green	246.00	306.00
Taxan Kaga Amber	251.00	311.00
Roland RGB	872.00	995.00
Kaga Vision Ex	455.00	565.00
Kaga Vision II	560.00	672.00
Kaga Vision III	775.00	930.00

PRINTERS

	OUR PRICE	R
INTRODUCING Olympia NP Dot Matrix 160 cps Draft mode switchable to 90 cps premium Letter quality. The quietest dot matrix on the market. Leading the way for Epson compatibles.	595	
EPSON		
RX-100	825.00	
FX-100	1215.00	1
FX-80	839.00	
RX-80 FT	595.00	
RX-80	465.00	
LQ-1500	1899.00	2
TOSHIBA		
P1350	2369	
P1340	1085	
Tractor	208	
Sheet Feeder	1095	
ROLAND		
8 Pen Plotter	1286.00	1
1 Pen Plotter	795.00	
BROTHER		
HR-15 par	675.00	
HR-25 par	1035.00	1
HR-15/25 Tractor Feed	108.00	
HR-15/25 Sheet Feeder	248.00	
WRITER'S DREAM Brother EP-44 Personal Electric Typewriter/Printer Serial Interface, Liquid Crystal Display, 4K Buffer, Electronic Calculator, Terminal Capabilities	369	

HARD DISKS

EVEREX	
10 mb	1945.00
Half Height Internal 20 mb	2165.00
Graphics	505.00
Colour	895.00
SYSGEN	
10 mb External	1595.00
Tape Backup 10 mb Tape/Disk	4495.00
20 mb Tape/Disk	5495.00

Level 2·0 Pe
Introductory
CALL!

	our price	R.R.P.
STAR GEMINI 10X 120 cps, 80 col, tractor, parallel, graphics, friction.	$399.00	$595.00
STAR GEMINI 15X (132 col)	$590.00	$795.00
STAR DELTA 10X serial/parallel included tractor/friction, 160 cps, 8K buffer — same as Epson FX-80.	$605.00	$850.00
STAR DELTA 15X same as Epson FX-100.	$795.00	$1185.00
STAR RADIX 10X serial/parallel included, rear tractor/friction, semi-auto sheet feeder, 16K buffer, 200 cps/50 cps near letter quality.	$935.00	$1536.00
STAR RADIX 15X 132 col, same as Epson LQ-1500, with tractor/serial/parallel, 16K buffer/sheet feeder.	$1095.00	$1860.00
STAR POWERTYPE serial/parallel included, 18 cps/standard Qume daisywheels/ribbons.	$495.00	$850.00

Turn your micro into a mainframe with Pick or Unix. Whether for development or business applications, wouldn't you rather maximize your PC than minimize it with MS-DOS? Have a true multi-user, multi-tasking computer just by attaching terminals to your serial ports. See what your machine is truly capable of with Pick or Unix.

Pick for the IBM PC
Unix for the IBM PC, DEC Pro or Apple Lisa

INTRODUCING THE OLIVETTI AT&T PC. NOW THERE'S A REAL ALTERNATIVE.

Its fast processing and high resolution graphics will help make any computer task a computing pleasure. In addition, you can expect more standard features. More expansion slots. More options for future growth.

Our PC is also totally compatible with the MS-DOS operating system. It runs the most popular off-the-shelf software (including Symphony, Lotus 1-2-3, Framework and Flight Simulator) with no modification. Financial analysis. Forecasting. Budgeting. Word processing. Inventory. The Olivetti/AT&T PC does it all.

And its flexibility means that when it's time to expand, our PC will actually make your computer growing pains painless.

Finally, there is Olivetti's unmatched nationwide service and support. Always there when you need it.

Looking for hardware, software, printers, paper, monitors, systems, diskettes, add-on boards or cables?? Call, write, telex or drop in to Cash & Carry Computers and Software. Special equipment?? Call! Our connections with some of America's largest computer warehouses make it easy for you to buy literally anything. Don't hesitate! Give us a chance to show you our commitment to not only price but service and support. Any doubts? Call us for local and interstate references. We accept Bankcard, Mastercard, mail or phone orders, cash, Bank cheque, company cheque, official company* and government purchase orders. Leasing? Have your finance company call for an invoice. Special circumstances? Call. We aim to please. $5 overnight delivery on most items.

* **subject to approved credit.**

Cash & Carry Computers & Software

Postal Address **P.O. Box 696, Darlinghurst 2010**
Office Address **480 Crown St, Surry Hills 2010**
TELEPHONE (02) 331 3888
Tlx No. ERNEX AA70842

All prices include Sales Tax. Price subject to change without notice.

This year's model. Every year.

Universe Supercomputer fulfils this seemingly impossible requirement. Because we don't bring out new models every year. We continuously improve the same one, in response to the needs of our customers.

When you buy Universe, you know you will continue to have the most advanced product, with the widest software base in the industry. Universe accesses over 65% of all applications software via its single, all powerful concurrent operating system , which is compatible with CP/M, CP/M-86, MP/M II and MP/M-86 software. Modular construction, based on IEEE 696 S100 cards means progressive enhancements are inexpensive and easy to implement.

Multiuser vs Networking

Universe is built to grow. In multiuser operation, it is up to 5 times faster than well known networked systems. And it costs much less!

On site service

A full 12 month on-site warranty (a Universe first in Australia) and service are carried out by AED personnel. The most advanced computer is also the most reliable!

Check out our record

Here are a few Universe initiatives that have helped make it this year's model.

1982: Universe releases locally developed concurrenc capability with MPS (Multiple program Selection) and SUPERAED enhancements to CP/M operating systems

1983: Universe introduces dual 8/16 bit processing. Development work on high speed Multiuser operating systems culminates in release of MP/M 8-16, catering f simultaneous use of 8 and 16 bit software by multiple users.

1984: Development work at AED on 80286 processor results in sub-mini performance from Universe. AED wi government grants for earlier MPS work and further gra for work on I/O/File processor. UNIX is currently being implemented on Universe.

Join us and stay **permanently** ahead of your competit

AED

Phone now for a consultation.
Sydney (02) 636 7677 Telex AA 70664,
Melbourne (03) 211 5542, **ACT** (062) 47 3
Perth (09) 450 5888

UNIVERSE SUPERCOMPUTE

Glover & Associate

new features have been added: an increased spreadsheet size, special word processing and communications facilities, and improved database facilities. Like Framework, Symphony offers multiple windows simultaneously onscreen, so more than one application can be viewed at once.

Of the three systems, and purely from a spreadsheet viewpoint, my preferred integrated system is Lotus 1-2-3. It offers everything you could reasonably expect from a spreadsheet system but very little else. The other systems are very much clogged up with word processing *et al* —not of much interest to the dedicated financial modeller. Lotus offers a trade-in for 1-2-3 to Symphony, so you can always opt for Symphony at a later date, which will handle anything you created with 1-2-3. However, if your prime interest is databases then you might plump for Framework, as it's also compatible with Ashton-Tate's dBase II.

Stand-alone systems

Most of the spreadsheet software currently on the market is of the stand-alone variety: that is, a single function software package. Although the software is single function, this doesn't always preclude it linking with other applications.

A popular ploy, predating integrated software, is to offer a range of packages all capable of exchanging data with each other. Apart from the comparatively recent Xchange software, but following Micropro's original Star series (WordStar, CalcStar, and so on) there has been a number of others, including the Perfect range of software (with PerfectCalc spreadsheet).

Another stand-alone spreadsheet strategy is to implement just the spreadsheet software, but provide a standard format for data transfer to be adopted by other software developers when implementing add-on facilities. Both VisiCalc and MultiPlan do this: VisiCalc has the DIF data interchange format, and Multiplan offers SYLK. Some developers do offer software that can read these formats.

Of these stand-alone systems, I would opt first for Multiplan. I would tie VisiCalc and Multiplan, but relations between Software Arts (Visicalc's writers) and Visicorp (the publishers) have turned sour of late. This has held up any enhancements to VisiCalc, and it now looks like Software Arts is turning its energies to its later product, TK!Solver.

Financial planning

Before spreadsheets existed, mainframe users expended a great deal of time and money on financial planning systems. A financial planning system is a programming language in which the program manipulates rows and columns in a matrix, and generates reports from it. Financial planning systems have found their way onto micros and borrowed some spreadsheet technology on the way. Although the programming language approach is still used, it's also possible for the VDU screen to act as a window onto the matrix.

These systems offer very sophisticated facilities for financial work, but would not appeal to technicians with more mathematically complex models. They are also slower in use, lacking the immediacy of the spreadsheet automatic recalculation facility.

After enjoying little success with the spreadsheet system CalcStar, Micropro waited some time before introducing the financial planning system PlanStar, my favourite. This system is packed with facilities not generally available in everyday spreadsheet software. Notable features include sensitivity analysis, consolidation and goal seeking.

Any user who has been spoilt by contact with some of the high-quality user-friendly micro packages will notice some considerable difference with financial planning systems. Although the concept of a programmable matrix is a good one, most of the financial planning systems have inherited too much of the old-fashioned mainframe approach to computing. You need to work quite hard to get these systems working for you, but it must be said that once they are in operation they offer some very powerful facilities.

Fig 1 shows the Benchtest results for the systems mentioned here. Note that the results are reprinted from the original reviews, where reviews were conducted, or at the time of release and do not take into account manufacturers' enhancements. Note also that not all versions of the products are covered by these tests, and in several instances the software is available on more than one operating system.

Well, there was no bounce on that keyboard, Sir!'

'Disks? . . . I think you want the record department, sir.'

Why do AVTEK modems work better?

MultiModem and MiniModem bring superior data transfer within every computer users reach.

Using new VLSI technology, these modems use digital signal processing to achieve functions normally requiring analogue filters. The result? Reliable data transfer on terrible lines where most modems just give up in disgust! An added benefit: digital modems never require alignment.

● They never requires adjustment.

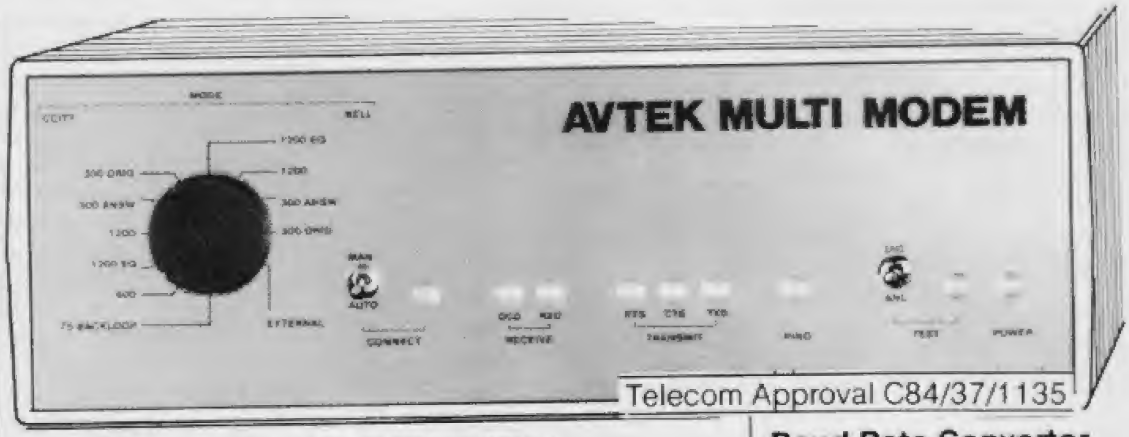
Complex modulation,demodulation and filtering functions are carried out by integrated circuit A/D and D/A convertors. A digital signal processor uses 24K of ROM and 1.3K of RAM to perform the filtering functions. Critical analogue adjustments give way to crystal locked precision.

● Digital filters mean less errors.

They are much sharper than on conventional modems. Line interference is screened out. You get error free data transfer, even on very noisy lines.

Auto Answer Option

What is autoanswer? It is the ability of your computer/modem to switch into receiving mode when the phone rings. Some computer/software combinations do this.MultiModem offers the alternative, for computers without this facility – a hardware autoanswer. You can leave your computer waiting for information.



Telecom Approval C84/37/1135

MODE	RATE	DUPLEX DESCRIPTION
1	300	Full Bell 103 originate
2	300	Full Bell 103 Answer
3	1200	Half Bell 202
4	1200	Half Bell 202 with equaliser
5	300	Full CCITT V21 Originate
6	300	Full CCITT V21 Answer
7	1200	Half CCITT V23 Mode 2
8	1200	Half CCITT V23 Mode 2 with equaliser
9	600	Half CCITT V23 Mode 1

MultiModem has all the standards.

You won't be left with an obsolete product. MultiModem gives you both Australian/European (CCITT) and American (Bell) standards at 300, 600 and 1200 baud.

While most facilities currently use modes 5 & 6 (300 baud (CCITT V21), the standard for Videotext is to be modes 7-9 (CCITT V23). MultiModem is ready for future developments.

MiniModem only $199.00 inc. phone

When only 300 baud full duplex is required, Minimodem is the right choice. Using the same digital filtering as MultiModem, it provides:

- 300 baud full duplex
- Answer/originate
- Includes phone hardwired plus plug
- Superior VLSI chip performance (identical to MultiModem).

● Telecom Approval C84/37/1173

Baud Rate Convertor

Coming soon, this powerful accessory for the MultiModem allows computers to communicate using split baud rates (1200/75 and 600/75, 75/1200) when they do not support it internally - (e.g. Commodore, Tandy and early MicroBees.)

MultiModem

Complete, including the phone hardwired into the modem.

$349.00

Autoanswer MultiModem

Includes phone and switchable hardware auto answer.

$399.00

Kit MultiModem

Save by building it yourself. Does not include phone. Not for connection to Telecom lines. **(only available from Avtek)**

$249.00

Autoanswer Facility (retrofit)

Module must be fitted by Avtek.

$59.00 plus $7.50 return P&P

Postage and Packing:

On Modems is $7.50 (registered). On other products is $3.00

Products for the MicroBee

MultiProm Interface Kit allows you to:

- Extend the ROM capacity of your MicroBee to 44K, or to a total of 308K by daisy chaining
- Takes 2532s or 2764s (can be mixed) and has 11 open collector outputs and eight buffered inputs;
- The address of the ports used for EPROM selection can be changed.
- Select between Editor/Assembler, WordBee, Logo, MiniPascal etc. with a few keystokes.

only $99.00

MultiROM Boards

XM-1

Fits inside the MicroBee and lets you select say WORDBEE or EDASM from the keyboard. Suits all Bees with 8000 serial number (or earlier) **$19.95**

XM-2

As XM-1 but suits all Bees with 9000 (MicroBee IC etc) serial numbers upward **$29.95**

XM-3

This great little adaptor allows owners of early MicroBees which use 2532 ROMs, to use the later 2764 ROMs. **$17.95**

AVTEK DEALERS

Melbourne
Rod Irving Electronics (03) 489 8866
Compak Computer Centre (03) 555 9844

Perth
Altronics (008) 999 007 (Orders)
(09) 328 1599 (Enquiries)

Brisbane
Jaycar (07) 393 0777

Sydney

Paris Radio (Kingsford)	344 9111
Jaycar (City)	267 1614
Jaycar (Hurstville)	570 7000
Jaycar (Carlingford)	872 4444
Jaycar (Concord)	745 3077

AVTEK

(Electronics) Pty Ltd

Call us on our new hotline

Phone 427 6688 or write to us C/O Lane Cove Post Office.

Glover & Associate

SOFTWARE

Filevision: data with meaning

Will the Filevision database, with its unusual terminology and use of graphics, help to dispel fears that the Macintosh is just an 'executive toy'? Peter Bright thinks so.

The problem with micros in business is that they have a nasty habit of taking once meaningful data and turning it into uninformative figures.

Database programs are often the worst offenders. Take something like stock control: at the start of the chain, the data means something tangible — someone has to go out and count how many widgets you've got. But by the time the computer has had a good munch at the data, you have to think hard about the difference between a widget and a wombat.

Another problem is that building database programs can be a pain. Of all the popular applications, database management is the only one that forces you to dive some way into the works of a micro and get your hands dirty. With a word processor, spreadsheet or graphics program the worst thing you might have to do is think of a new filename. But with a database you have to work out the file structure and field types and, in most cases, field lengths — the list is endless. Even then, you usually have to write an ultra high-level program if you want your database to do anything useful.

Filevision for Apple's Macintosh differs from all the other databases I've seen in that it associates an onscreen picture with each record in the database. You not only get data about your item, you get a picture of it too. It also relieves you of the chore of having to specify the data type for each field or even the field length. The net result, according to the advertising blurb, is that even a computer-naive Macintosh user can create and use a database with a quick flick of the mouse.

Filevision is supplied on a single 3½in disk along with a surprisingly thin manual. When you try to copy the distribution disk, it looks for all the world like you've succeeded. All the files appear to be there and the program gives the impression that it will load, but half way through loading a copy of Filevision

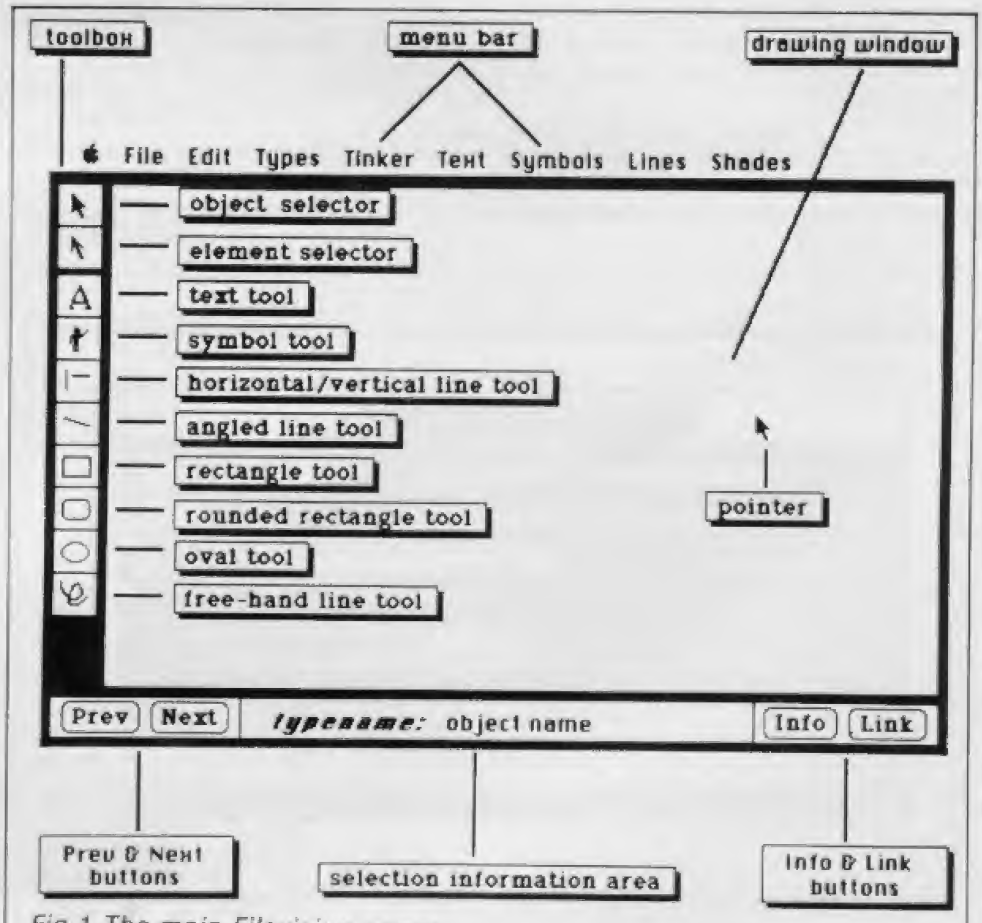


Fig 1 The main Filevision screen

the Mac spits out your disk and asks you to insert the distribution disk. It then reads a few copy-protected routines from the disk and lets you re-insert your copy and carry on.

This is a clever trick and while it does reduce the likelihood of your distribution disk being corrupted, it still means that you're reliant on that one disk.

Before I delve into the workings of Filevision, I'll cover the package's terminology — it isn't the same as is used elsewhere.

The disk file where the data is stored is called the 'drawing file'. The maximum size for a drawing file is 132k, the minimum is 4k, and we'll see later that this needn't be a restriction because you can chain disk files together. You can have as many different drawing files as will fit onto a disk.

At the next level down from the drawing file are 'types'. It's easiest to look on a type as a logical file — think of it in the same way that you would a data file in any other database. When you set up a type, you also define how the data in each record will be structured; each type can have a different data structure. You can have up to 16 types in any one drawing file.

It's worth putting some thought into the way you're going to set up types, because most of the search and printing functions in Filevision will only work on one type at a time. You don't want to end up with important relevant data in two different types.

Below the types are 'objects', which are roughly equivalent to records in any other database; the major difference being that each object has a drawing as well as data associated with it. The maximum number of objects per 'picture file' is 999, which cannot consume more than 2k (2000 characters).

Objects are made up of 'data fields'. Both fields and objects are variable length, so you don't need to worry about making fields long enough. You don't need to declare the field type either (alphabetic, numeric, date, and so on), so setting up the structure is extremely straightforward. The only limitation is that there's a maximum of 30 fields per object.

So to sum up, a Filevision disk file is known as a picture file. This contains up to 16 logical files called types. Each type has a unique data structure made up of objects (records) which, in turn, are made up of data fields.

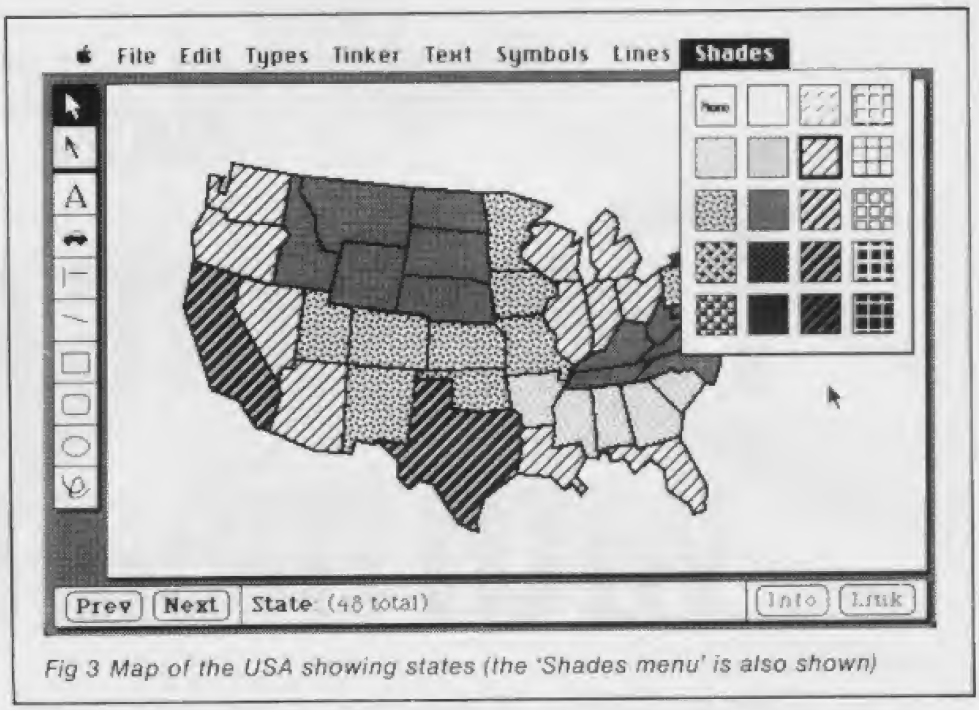


Fig 3 Map of the USA showing states (the 'Shades menu' is also shown)

In use

Filevision can be started in two ways. To open a new file, you select the Filevision ikon from the finder. But if you want to call up a previously saved file, you select the ikon relating to the file and the system automatically loads Filevision and auto-runs your file. You can obviously load and save files from within Filevision too.

Assuming that you're creating a new picture file, the main Filevision screen looks like Fig 1. You'll see that there are nine pull-down menus running along the top of the screen and 10 tools in the toolbox running down the left side. The remaining screen space is taken up by the drawing window, which is blank at the moment.

The first step to creating a new database is to set out a structure for the data in each type. This is achieved using the 'Types' pull-down menu.

The system always has one default type in place called background. This can be used for anything you like, but its usual role is to make the picture look pretty rather than to hold data.

To create a new type you select 'Add Another' from the Types menu which calls up the data definition screen (Fig 2). The system automatically allocates two default lines — Name and Link. Name is used as a key for searches, so it pays to put some thought into the data you put in that name field; link will be described later.

To add a new field, you select the Add

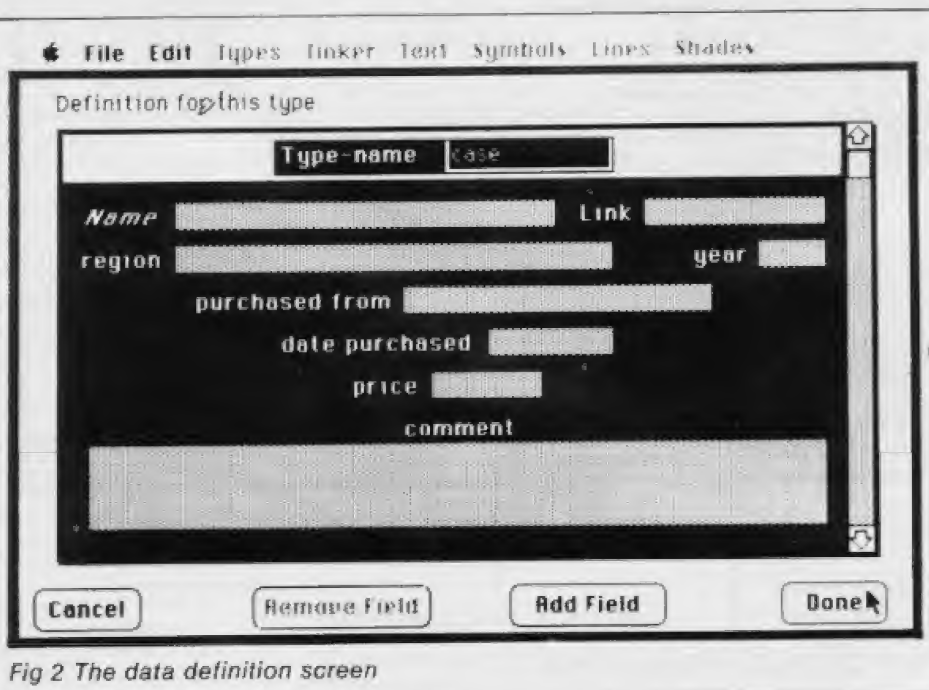


Fig 2 The data definition screen

Our Guarantee

WE GUARANTEE TO SUPPORT ALL SOFTWARE AND HARDWARE WE SELL

SORCIM

Supercalc 2	$324.00
Superwriter	$325.00
Supercalc 3	$369.00

MICROSOFT

Fortran Compiler-80	$695.00
Basic Compiler MSDOS	$570.00
Basic Interp. MSDOS	$490.00
Business Basic Comp MSDOS	$690.00
Multiplan Apple DOS	$199.00
Multiplan CP/M	$295.00
Multiplan MSDOS	$295.00
Pascal MSDOS	$475.00
Macro Assembler MSDOS	$275.00
Flight Simulator	$85.00

REDDING GROUP

Graftalk	$570.00

HARDWARE

Sanyo 1 x 360K Disk, Daisy Wheel Printer including free software	$2795.00
Sanyo 2 x 360K Disk, Daisy Wheel Printer including free software	$3444.00
President 512K, 2 x 360K, Colour including free software	$4340.00
President 512K, 1 x 360K, 10MB Colour including free software	$6280.00

PRINTERS

C-Itoh	105 cps, Graphics,	10"	$605.00
"	120 cps, "	10"	$878.00
"	180 cps, "	10"	$1060.00
"	120 cps, "	15"	$1245.00
"	180 cps, "	15"	$1248.00
"	20 cps, Daisy Wheel		$1007.00
"	30 cps, " "		$1282.00
"	40 cps, " "		$2285.00
"	55 cps, " "		$2742.00

ASHTON-TATE

D-Base II	$540.00
D-Base III	$685.00
Framework	$685.00
D-Base II Primer Book	$35.95
IBM Encyclopedia	$122.45

DIGITAL MARKETING

Milestone	$389.00
Milestone-86	$389.00

DIGITAL RESEARCH

Access Manager-80	$375.00
Access Manager-86	$490.00
DRI C Compiler-86	$456.00
C-Basic Compiler-80	$589.00
C-Basic Compiler-86	$714.00
Display Manager-80	$480.00
Display Manager-86	$604.00
DR Graph	$245.00
DR Logo-86	$205.00
Pascal Mt+ -80	$430.00
Pascal Mt+ -86	$728.00

MIRCO DATA BASE SYSTEMS

Knowledgeman	$645.00
K-Man Demos	$130.00
Discover K-Man Book	$35.50
K-Graph	$350.00
K-Paint	$262.44
K-Man Syntax Guide	$30.00

MICROPRO

Wordstar Prof.	$575.00
Wordstar 2000	$595.00

Prices subject to change without notice. All prices include sales tax.

FREE

INFORMATION
For orders or further information please contact
ARCHIVE COMPUTER SERVICES SYDNEY P/L
Shop 13, Mount Street Plaza, Mount & Walker Streets,
North Sydney, 2060
Or Telephone (02) 923 1200

AS

Please send me

Product ..... Qty .....

Name .....

Address .....

..... P/Code .....

B/card No .....

Signature .....

Add $4.00 Postage Total $ .....

Give yourself a break ...

How many activities are you doing at the moment? Reading, listening, thinking. Why shouldn't your Personal Computer be as versatile? Think of the time it could save you. No need to wait while your PC runs payroll or quit your spreadsheet to answer questions about stock. ■ You need the timesaver — the remarkable Concurrent PC DOS from Digital Research. This lets you run up to four separate jobs simultaneously. You start a single program just as you do now. But when you want to, just touch a key and you get a fresh screen to work with... while your original program continues to run. ■ A two-user facility is ideal for people who communicate regularly to remote staff or offices. ■ Remember, each of your four programs is only a keystroke away. ■ And with the built-in window facility, you can keep track of all of your work on screen simply and easily. ■ **Get a personal demonstration of Concurrent PC DOS at your local micro dealer, or complete the coupon below for more information.**

Switch to Concurrent PC DOS

DIGITAL RESEARCH

I want to switch to Concurrent PC DOS, please send me more information

My Name is .....

Company Name .....

Address .....

..... Postcode .....

The micro I currently use is .....

and software .....

Write to the address below for more information, or visit your local computer dealer for a demonstration.

■ 252 Abbotsford Road ■ Mayne, Brisbane Q 4006
■ Fax (07) 52 7820 ■ Telex AA44187
■ Phone (07) 52 9522

arcompacific

Brisbane ■ Sydney ■ Melbourne ■ New Zealand ▪ master distributor ▪

Field button at the bottom of the screen. The system then says 'Where?' and the cursor turns into a picture of a hand. To create the field, position the cursor where you want the field to be displayed and hit the mouse button. You then use the mouse to stretch or contract the field size to your heart's content. It doesn't matter if you find later that you didn't leave enough space: just stretch the field with the mouse. You can add or remove fields at any time, even when you've entered all your data. Ah, the wonders of variable length fields.

Using this combination of mouse and variable length, non-typed fields creating the field structure for the different types are very easy.

After you have created all the types and field structures you need, you can progress to the more interesting job of drawing objects.

The easiest way to describe how objects work onscreen is to give an example. If you look at Fig 3, you'll see a map of (most of) the USA broken up into states. The data hiding behind this map gives information on fictitious offices of a company. If you want to know the annual sales of a particular office, just highlight the area and the data screen is displayed.

This picture was created using the 'tools' listed down the left side of the screen; there are eight different drawing tools and two pointing devices. From top to bottom the tools allow you to draw/edit text, symbols, straight lines, rectangles, rounded rectangles, ovals and freehand lines.

Text can be modified in any of the usual Mac ways — different fonts, styles, point sizes, and so on. You can create different symbols using the symbol editor (Fig 4). The system is supplied with 20 pre-drawn symbols, but you can easily create new ones by calling up and modifying the symbol.

Any enclosed spaces such as rectangles or ovals can be filled with any of 20 different shading patterns using the 'Shades' pull-down menu.

The example picture is made up of forty eight different objects which on their own are only lines and shades, but which together make up the map of the USA. Each object can be individually selected and edited — you can move, expand, contract and even reshape objects at any time.

For every object drawn, Filevision creates a related data record. The structure of the record depends on the type under which the object was created. To enter or view data relating to a particular object, you move the pointer to it using the mouse and double click the mouse button; the system then displays the information screen which you designed when you created the type. Within this screen you're free to enter or amend data and play with field lengths, but you can't add or delete fields (this option is available from the 'Tinker' menu).

The only potential problem with the drawing file is that you have to draw a great many objects on the screen just to make the picture look prettier. This is all very well, but you're left with a corresponding number of empty data records which were created for the superfluous objects. An example of this is the map of the USA where useful data is only associated with the states containing the fictitious company's offices. The remaining states make the picture easier to understand and don't have data associated with them.

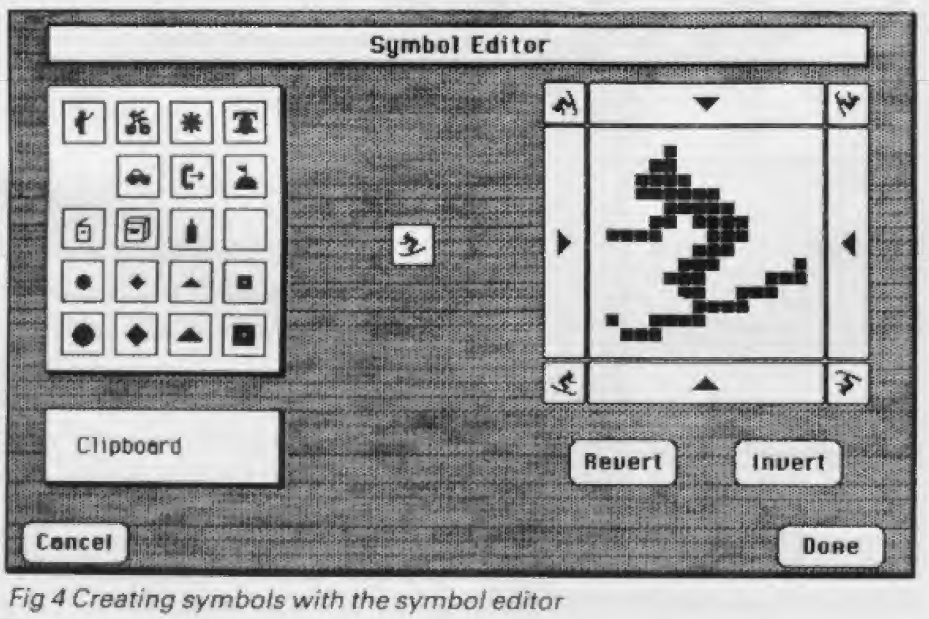


Fig 4 Creating symbols with the symbol editor

It's possible to overcome this problem to some extent by using 'Elements'. You can create complex composite objects by holding down the SHIFT key while you draw the object, which combines the shapes you draw into one object. In this way, you can draw a square within a square which Filevision counts as one object instead of two.

Linking

'Link' is one of the fields automatically created by the system for each object, and is one of the most interesting features of Filevision. If an object has a link entry, the user has the option of calling in a whole new drawing file corresponding to that object from disk. As long as you have enough disk space, you can build up a tree structure of Filevision drawing files.

Let's look at an example. At the top level you have a drawing file showing a map of the world. Each object in the file contains basic details about a country and a link calling a drawing file showing towns in that country. This can go on until you run out of disk space.

The effect of linking is very impressive. To continue the world theme, you could select Australia on the map of the world and be presented with a detailed picture. You could then select Sydney and get a map, select Manly, then a street, and so on down as far as you want to go.

This, of course, is an extreme example. The amount of data and therefore disk space needed to do this is incredible, but it's easy to conceive of projects going one or perhaps two levels down.

The Tinker menu

The quaintly-named 'Tinker' menu allows you to highlight objects which conform to certain criteria. The main options are: 'Hide These', 'Show Only These', 'Highlight All', 'Highlight Some' and 'Ignore'. The Tinker options only work on one type at a time, so before you use them select the type you wish to work on from the types menu.

Hide These allows you to stop the specified type from being displayed onscreen, which is useful for narrowing down the data you're working on. Show Only These removes everything from the display apart from the selected type.

Highlighting is Filevision's way of selecting data that matches certain criteria. Highlight All displays all the objects in the current type in emphasised print. Types which haven't been selected are displayed in a de-emphasised light grey print.

Highlight Some is the most useful of all Tinker's options. It highlights only

those records in the current type which meet criteria you have laid down.

When Highlight Some is selected, Filevision displays the selection screen (Fig 5) which allows you to use the mouse to select objects on up to four different criteria ANDed together. The left side of the screen is used to enter your criteria, and the right side shows what you've entered.

It's possible to use the mouse to enter nearly all the selection criteria; first select the field you wish to work on. The entry box can only display five field names, so if your type contains more than five fields you have to go to a separate screen and decide which ones will be displayed on the selection screen. This works well enough, but it would be easier to scroll through the fields from the selection menu.

Once you have selected the field, you use the mouse to select the criteria. Boxes are provided for the verbs 'is', 'is not', and for the operators 'equal to', 'greater than' or 'equal to', 'less than' or 'equal to', and 'between'.

Finally, you can enter the number or string with which the data is to be compared. If you've doing a string search, Filevision allows you to tune the matching using '^' , '.' , '*' , '..' and '@'.

'^' looks for an exact match at the start of the field. As soon as it has found it, it doesn't bother to look any further in that field. For example, if you specify '^FRED', Filevision matches 'FRED BLOGGs' but not 'RED FRED BLOGGS'. '..' is a wild card match for any character; '@' is a single character wild card; and '@@FRED' will find any occurrences of FRED preceded by any two characters.

The highlighting section's main restriction is that it only allows you to AND a maximum of four criteria. This is fine for most applications, but on one or two occasions I found it a problem.

The only way around it is to apply your four criteria to the current type and then change all the highlighted objects to a new type; this allows you to apply four more selection criteria to the new type. Although this works, it's rather messy and goes against the basic idea of Filevision.

When you choose the Highlight Some option all the objects which meet your criteria are highlighted onscreen, and everything which doesn't is shaded in light grey.

Printing options

In addition to displaying data onscreen, Filevision also produces various printed reports. There are four printing options, all available from the 'File' pull-down menu. The print options work closely with the screen highlighting options. If you haven't highlighted anything on the screen, the print options will assume that you want all objects in the current type to be printed out. However, if you have highlighted various objects, the print options will only print these.

The first option allows you to dump the screen to the printer. This is available permanently and is useful for getting hard copy of pictures with different highlighting according to different criteria.

The second option is 'Print Info', which prints out all the fields of the selected objects. When it's selected, Filevision allows you to specify headers and footers for the pages along with the field the objects will be sorted on. You can also decide the print quality of the report using the standard Mac printing option box.

The third option is 'Print List', which allows you to create a tailored report based on the selected objects within the current type. In addition to selecting the sort field and the headers and footers, you can also specify how your report should look by specifying fields as column headings across the width of the page. Filevision will then print out the selected fields giving each object a new line. You can specify if the data in each field is printed ranged left, centred or ranged right to make your printout visually pleasing.

The final option is a label printer for printing data onto address labels. The screen shows an outline of a label and allows you to specify where selected fields will be printed.

The report generating options were the only area which disappointed me. Although I can see that setting out data pictorially on the screen cuts out some of the demand for printed reports, there will still be times when they're necessary.

The printing facilities aren't comprehensive enough to cope. You can only sort out one field at a time, and the sort can only be in ascending order. There's no provision for totalling of fields or value-based page breaks. You're also limited to printing data in column order; if this doesn't suit, bad luck.

Documentation

This consists of one 150-page spiral-bound manual. When I first saw it I thought that it was so short it couldn't hope to cover all the aspects of Filevision adequately — database manuals usually make *War and Peace* look short. After using the manual I can say that not only does it cover every area, but that it's the best manual I've ever used of any kind.

Great use is made throughout of illustrations and emphasised printing. Everything is very well broken up and exceptionally easy to follow. The manual is divided into three sections — Learning Filevision, Using Filevision and Filevision Reference. The first section is a tutorial designed to be used in conjunction with a demonstration file provided on the distribution disk. It's only after you've finished the tutorial that you realise that it's taught you everything you need to know about Filevision.

The rest of the manual just provides back-up — it's the tutorial that does the real work.

Conclusion

I've become bored recently with new business software. While the names may

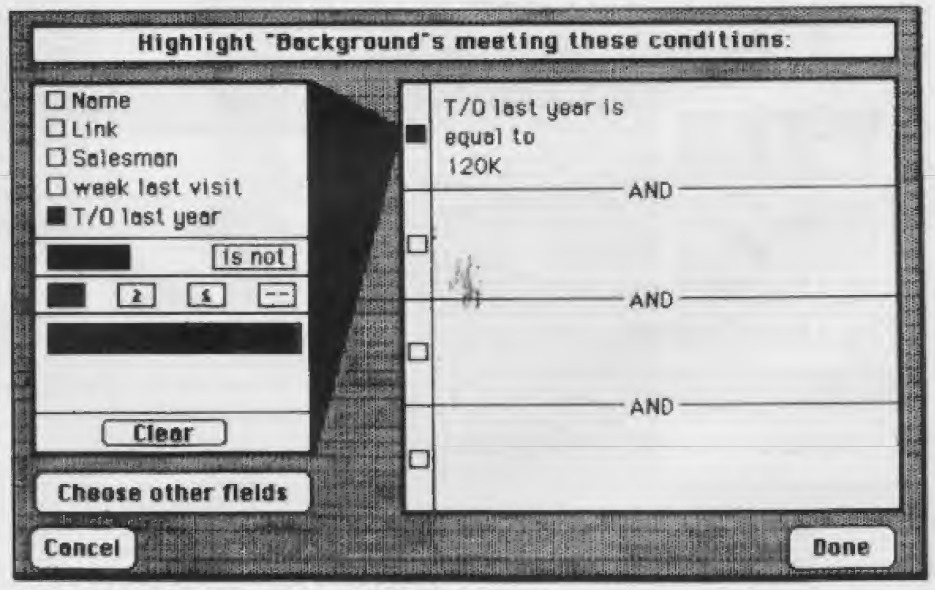


Fig 5 Selection screen from the Tinker menu

It Reads, Writes and does Arithmetic. It Paints in 3-D, Keeps Your Appointments and Talks to the World.

OPEN ACCESS is now available
for the following MS DOC/PC DOS microcomputers:—

AT&T PC; Chamellion; Columbia; Compaq; Corona; Data General; DEC Rainbow; Eagle; Emtek; Ericsson; Friend; HP-150; Hyperion; IBM PC; ITT Extra; Monroe; NEC APC III; NCR Decision Mate V; Olivetti M24; Pantek; Philips PC; President; Sigma Elite; Sperry PC; Tandy 2000; TeleVideo; Texas Instruments PC; Toshiba T-300; Wang PC; and Zenith 150.

O·P·E·N ACCESS

"OPEN ACCESS," is the result of 60 man-years of effort to create a truly do-it-all, super-program — one that can perform virtually every task you're ever likely to encounter.

The beauty of it is, all that capability resides on a single program. You don't have to re-enter data. Or spend time trying to get unmatched programs to work together.

OPEN ACCESS takes its name from the source of its power — a relational data-base manager that gives you access to more data in more ways than any comparable software.

OPEN ACCESS includes an electronic spreadsheet, 3-D graphics, word processor, appointment scheduler and telecommunications module — all revolving around the powerful information manager.

For your nearest dealer contact the Australian distributor...

SOFTWARE SUPPLIERS

7 Avon Road
North Ryde, NSW 2113
Telephone (02) 888 1955
Telex AA 75364

change, the products remain very similar. Filevision is the first product for a long time which is truly innovative. In the process, it has brought database technology to the point where it can be used by the proverbial ingenuous Macintosh user. The use of graphics may at first sight look like a gimmick, but this view couldn't be further from the truth: the graphics allow you to see what the data *means*.

The biggest bore with any database is usually entering the data. Apple is predicting that a whole new market will develop offering ready-made 'data packs' for use with Filevision. Instead of using printed reports, market research companies and the like could just produce a Filevision drawing file with all the data already installed and distribute it on disk.

If this idea caught on, it could have dramatic effects. Instead of ploughing through pages of printed reports, you could call up the required information and analyse it in your own way. Not only that, but the data is represented pictorially. It's a great idea.

Apple says it hopes that Filevision will do for the Mac what VisiCalc did for the Apple II. Obviously some of this is hype but it certainly has the potential, especially if the data pack on disk idea catches on.

This product has not only made me rethink my view of databases, but also my view of the Mac. In the past I didn't want the hassle of setting up a database: now it's positively fun. Where I used to regard the Mac as a glorified executive toy with little practical value, I now see it as a potentially very powerful tool capable of much more than I at first thought.

Although Filevision won't solve all database problems, it's still the best piece of new software I've seen during the last year.

Filevision is manufactured by Telos Software and sold by a number of dealers throughout Australia.

'That's a load off my shoulders. . .'

RIGHT PRICE. RIGHT SIZE. RIGHT SPEED.

That's Riteman!

If you're looking for an Epson or IBM** compatible dot matrix impact printer that's lower in price, smaller, durable, and fast enough to keep pace with your work flow . . . we'd like to show you a Riteman!*

Four great new printers. All priced well against comparable Epson models. All substantially smaller. Yet solid as a rock. With print speeds up to 50% faster than the competitors.

The Riteman Plus, Riteman II, Riteman 15, and Riteman Blue Plus with IBM graphics. All are backed by a full one-year warranty. And, as you can see, they're great-looking, too!

For further information contact your local Riteman dealer, or Warburton Franki

** Epson is a registered trademark of Epson America, Inc.*
***IBM is a registered trademark of International Business Machines Corp.*

:RITEMAN:

Distributed exclusively in Australia by:-

Warburton Franki

A DIVISION OF THE ANI CORPORATION LTD (INCORPORATED IN N.S.W.)

• ADELAIDE (08) 356-7333 • BRISBANE (07) 277-0222 • HOBART (002) 28-0321
• MELBOURNE (03) 795-9011 • PERTH (09) 277-7000 • SYDNEY (02) 648-1711
• AUCKLAND N.Z. (09) 50-4458 • WELLINGTON N.Z. (04) 69-3016

WF936/81

NOW there is a REASON to buy a computer. Introducing . . .

Meta-4

the australian data base adventure

A WINNER

WINNER of 1st PRIZE in the Business Division of the 1983 AUSOM* Challenge programming competition sponsored by VERBATIM (Australia) Pty. Ltd.

*Apple Users Society of Melbourne

META4 is a revolutionary new data base system which gives YOU full control of your computer with NO PROGRAMMING. No other data base system even comes near it. Now you can have an integrated Data Base system for your business for only $395.00.
META4 may be the only program you need to buy for your computer.

1. MONEY-BACK GUARANTEE

If you are not satisfied with META4, return it within 14 days for a cheerful refund. If you buy from a dealer, check he is prepared to do this before you buy.

2. TELEPHONE CONSULTING

If there is something you want clarified after you have purchased META4, ring us up. Maximum time for any one call 15 minutes.

BASIC FACILITIES

META4 is a comprehensive Data Base Management system, including:
- FULL DATA BASE
- SIMPLE SPREAD-SHEET
- SIMPLE WORD-PROCESSING
- MAILING LISTS
- STANDARD LETTERS
- LABELS

THINK OF AN APPLICATION

META4 is suitable for a very wide variety of business, professional, academic and personal applications, such as

BUSINESS
CUSTOMERS, QUOTES, ORDERS, SALES, INVOICES, ACCOUNTS, CREDITORS, NAMES, LETTERS, ADDRESSES, FINANCIAL, LABELS, SUPPLIERS, PRODUCTS, CATALOGUES, PERSONNEL, ORG STRUCTURE, DEPTS

PROFESSIONAL
MEDICAL, DENTAL, LEGAL, PHARMACEUTICAL, INSURANCE, FARMING

ACADEMIC
LIBRARY, STUDENTS, TIMETABLES, SCORES, BOOKS, BORROWERS, PAPERS, AUTHORS, REFERENCES, LECTURES, FORMULAE

INDUSTRY
VEHICLES, REPAIRS, MAINTENANCE, PRODUCTION

REAL ESTATE
PROPERTIES, ENQUIRIES, ADVERTISING, CLIENTS, RENT, COMMISSIONS

PROJECT
TASK LISTS, SCHEDULES, DIARY, MEETINGS, MANUALS, DOCUMENTN, TIMESHEETS, ESTIMATING, BUDGETS

Information from any or all of the above applications can be AUTOMATICALLY LINKED & CROSS-REFERENCED, since META4 is a true Data Base system.

BASIC CONCEPTS

META4 uses familiar concepts to aid you in it's use.

ROOMS — META4 has many rooms in it. Each room is used to store information about a different type of thing.

QUESTIONS & ANSWERS — when you go into a ROOM META4 asks you QUESTIONS about the type of thing (e.g. CUSTOMER, INVOICE, PRODUCT etc) held in the ROOM and stores away your ANSWERS.

RECORDS — META4 stores the ANSWERS to a set of QUESTIONS in a room as a RECORD. There can be many RECORDS in a room.

DOORWAYS — You can move from ROOM to ROOM through DOORWAYS. META4 automatically relates information in one ROOM to information in the rest.

BUILDINGS — A building is a collection of related ROOMS and DOORWAYS. A BUILDING corresponds to the traditional concept of a Data Base.

META4 IS PORTABLE

Any application you develop under META4 will run without change on any computer that META4 runs on.

EASE OF USE

- SIMPLE AND CONSISTENT
- HELP — 3 levels for the current
  - —BUILDING you are in
  - —ROOM you are in
  - —QUESTION being asked
- 3 TUTORIALS
  - —USING META4
  - —DESIGNING WITH META4
  - —META4 EXAMPLES

Designed from the ground up to be totally consistent and as easy to install, learn and use as possible.

META 4 IS EXTENDABLE

All the features of the system are fully extendable to your own applications. You can add your own BUILDINGS, ROOMS, DOORWAYS, and QUESTIONS. You can define your own maps, HELP text and tutorials.

SELLING YOUR META4 APPLICATIONS

If you wish to sell your application you will have the widest possible market. We will evaluate your application and may assist in marketing it.

DETAILED FACILITIES

- Menu drives
- True DATA BASE — RELATIONAL/NETWORK
- Variety of Answer-types e.g. CALCULATED, DATE, YES/NO, NUMERIC, TEXT, LIST
- FULL PROMPTING
- Automatic VALIDATION
- Powerful Selection & Reporting
- All facilities fully EXTENDABLE to user's own applications
- No programming
- Full DATA DICTIONARY defined as a META4 application
- Automatic TOTALLING of lists
- Automatic COPYING of ANSWERS from one room to another
- Automatic MAINTENANCE of records in other rooms (Secondary Index facility)
- Copying of information to and from other products such as WORDSTAR
- B-Tree ISAM Source Code

DISK FORMATS AVAILABLE

5" IBM-PC DOS 320K
5" APPLE-II CP/M 126K
8" CP/M SS/SD 256K
Other formats by request

MINIMUM HARDWARE REQD.

CP/M — Minimun 56K System

IBM PC-DOS, MS-DOS — Minimum of 128K RAM

APPLE-II — 64K RAM, 80-Column Card, CP/M card, 2 diskette drives

Prices (inc. Sales Tax)

Manual alone	$30.00
META4 (CP/M)	$395.00
META4 (IBM-PC)	$395.00
META4 (MS-DOS)	$395.00
Non-Standard Disk Conversion	$50.00
Post & Packaging	$10.00

VISA AMERICAN EXPRESS bankcard welcome here

BACK A WINNER! GO FOR META4. ORDER DIRECT FROM: **SYSTEM SOLUTIONS PTY. LTD., 28-30 PALMERSTON ST, BERWICK VIC (03) 707 2851**
OR FROM ANY OF THE FOLLOWING DEALERS:
VIC: ALPHA R & D (AUSTRALIA) 789 4658. COMPSOFT MICROCOMPUTER SERVICES (03) 428 5269. COMPUTERS 2000 (03) 781 4244.
METROPOLITAN BUSINESS MACHINES (03) 383 2222. PRESIDENT COMPUTERS (03) 529 1788. ROBCOM (AUSTRALASIA) (03) 429 6233
NSW: J.T. MICROCOMPUTERS (02) 848 0452. THE COMPUTER WORKS (065) 53 5485
QLD: MERMAID COMPUTERS (075) 35 5511
WA: COMPUTER AGE (09) 384 1111 SA: COMPUTER MARKETING HQ (08) 260 2444. GENERAL BUSINESS MACHINES (08) 42 0031

Caught in a trap

The 'cascading IF syndrome' can plague Microsoft Basic programmers struggling with the problems of data validation. Ron Yuen has the cure.

Many programmers never use the error trapping features available in Microsoft Basic. Others may not even realise why they exist, and what can and cannot be done with them. So for all you that haven't used them or don't, here are some useful ideas.

The standard reason as to why the command
ON ERROR GOTO <line number>
exists is usually *to enable errors to be dealt with by the program* — as opposed to letting it crash as would otherwise happen. This is very true but not very informative. What sort of errors? Logic, data, input, disk and catastrophic errors are all common.

In my view, it's better to look on the command as a powerful aid to *verification* and *validation* techniques.

Microsoft Basic, in the Extended and Disk versions (as used under CP/M, for instance), can recognise 47 different error conditions. When a program is running and an error condition is detected by the interpreter (or compiler run-time module), an appropriate code number is allocated to the reserved function ERR, the line number generating the error is stored in another reserved function ERL, and program execution is terminated with the error messages displayed.

If the error happens to be in the program logic, then a crash is what you deserve. On the other hand, many error conditions are generated because information typed in at the keyboard is incorrect or not what the program expects. A good applications program will be able to handle these kind of errors in a controlled way *in-house*, and it's because of this feature that I consider error trapping to be a validation tool.

If an error is detected (some errors can't be trapped) once error trapping has been enabled by the ON ERROR command, control will pass to the specified line number. To get back into the main program a RESUME, RESUME NEXT, or RESUME <line number> command must be issued.

Error codes

The Microsoft Basic manual describes all 47 error messages in some detail.

Numbers 1 to 30 are mainly errors arising from faulty syntax or bad program logic. However, one or two of them might conceivably arise *on purpose*, and program flow can be redirected if they are detected.

Error codes 50 to 67 inclusive are concerned with various Disk Errors and it is here that error trapping is at its most useful.

To see how things work let's write a rough program outline for a practical

```
100  REM ****** Main program ******
120  PRINT "Input name of Data File" ; : INPUT FILENAME. TWO$
140  PRINT "Input name of Report File" ; : INPUT FILENAME. THREE$
160  PRINT "Input name of Code File" ; : INPUT FILENAME. FOUR$
180  GOSUB 1000 ' search the data files
190  STOP ' **********************
1000 REM first subroutine
1010 OPEN "1", 2, FILENAME. TWO$
1020 OPEN "0", 3, FILENAME. THREE$
1030     FOR X = 1 TO 100
1040       INPUT #2, CODE%, INFORMATION$, AMOUNT
1050       GOSUB 1500 ' search for matching name
1070     NEXT X
1080 CLOSE 2
1090 KILL "OLDDATA.BAK"
1100 NAME FILENAME. TWO$ AS "OLDDATA.BAK"
1110 RETURN ' ********************
1500 REM search code/name subroutine
1510 OPEN "I", 4, FILENAME. FOUR$
1520     FOR Y = 1 TO CODE%
1530       INPUT #4, NAME$
1540   NEXT Y
1550 RETURN ' ********************
```

Listing 1 Main program

Line	ERR	Probable reason
1010)	53	Wrong filename typed
1510)		
1020)	61	Disk is full
1040)		
1530)	67	Directory is full
1040)	13	Wrong filename but it exists and records are in a different format Possibly filename is OK but data is corrupted
1100	58	"OLDDATA.BAK" already exists
1010)	62	Endof file reached and
1510)		data not found
1010)		
1020)	64	Incorrect filename format
1510)		

Fig 1 Potential program problems

problem. In order to keep things simple the program (Listing 1) is written in 'pseudo-MBasic' using occasionally *crude* methods.

The program fragment (Listing 1) deals with a typical situation in business programming, or indeed any file-handling job. Data is read from one file as a result of which (and depending on the data) a second file needs to be accessed to get yet more data. Finally, selected data items from both files are written to a third file.

```
130   WRONG.FILE$ = FILENAME.TWO$      :
      NAME FILENAME.TWO$ AS FILENAME.TWO$
150   WRONG.FILE$ = FILENAME.THREE$    :
      NAME FILENAME.THREE$ AS FILENAME.THREE$
170   WRONG.FILE$ = FILENAME.FOUR$     :
      NAME FILENAME.FOUR$ AS FILENAME.FOUR$
```

Fig 2

```
2010  IF  ERR=64
          THEN PRINT WRONG.FILE$;" is in the wrong format !"; :
               RESUME <ERL - 10>
```

Fig 3

```
2010  IF  ERR=64
          THEN PRINT WRONG.FILE$;" is in the wrong format !"; :
               RESUME 2020
2020 ' a re-routing routine for ERR=64
2030  IF  ERL=130 THEN RESUME 120 :
      IF  ERL=150 THEN RESUME 140 :
      IF  ERL=170 THEN RESUME 160 :
```

Fig 4

Ignore the fact that the subroutine at 1500 is inefficient: it illustrates the point very well. Looking at what could (very easily) go wrong with the program, not through faulty logic but just from having *bad* data *forced in*, possible sources of problems are shown in Fig 1. Any of these errors will lead to a program crash but they are all easy to trap. ERR 62 is best trapped using the EOF function, and not by the ON ERROR techniques. For example use a line like: IF EOF(file number) THEN <action>

For the rest the first thing to do is initialise the error trapping routine. The best place to do this is right at the start of the program. In our example simply insert the line:

110 ON ERROR GOTO 2000

Immediately an error is detected the program will jump to line 2000 with the variables ERR and ERL set.

At line 2000 we must insert a routine

Headaches cured

Genesis computerised medical practice management

Genesis is a powerful and comprehensive software package that takes over the record keeping and accounts for any medical practice.
Developed in Australia, Genesis suits individual doctors and multi-doctor practices. GP or specialist.

- ☐ Runs on most microcomputers
- ☐ Simple for receptionists to use
- ☐ Produces a comprehensive range of reports for the practice manager
- ☐ Uses a database approach
- ☐ Supported by an Australia-wide dealer network with a telephone hotline service

Genesis is the solution

Also from Cerebral Solutions

MICROSTAT

MICROSTAT® Rel. 4.0 has all the powerful features that have made MICROSTAT the most popular interactive statistics package for the past several years and now includes:

* Interface with ASCII files and external data base/spreadsheet files.
* Output redirection to text files for editing and report generation.
* Missing data handling.
* Improved Recode/Select options.
* Handles large data sets. File size is limited only by disk capacity for most procedures.
* Data Management Subsystem (DMS) for file creation plus the ability to: edit, list, destroy, delete cases, augment, sort, rank order, lag, move, merge and transform the data.
* Data transformations include: add, subtract, multiply, divide, reciprocal, log, natural log, natural antilog, exponential, linear transformation, adding any number of variables to create a new variable, plus others.
* The DMS places you in complete control of the date files and allows you to create new variables from existing variables via the transformations.

Other features include:

* Descriptive statistics
* Hypothesis tests
* Analysis of Variance
* Scatterplot
* Correlation analysis
* Simple, Multiple, and Stepwise Multiple Regression analysis
* Time Series analysis
* Nonparametric Tests
* Crosstabs
* Factorials, Permutations, Combinations, and Probability Distributions

Runs under MS-DOS/PC-DOS, CP/M86, and CP/M. Requires 128K memory (64K fir CP/M).

Using Genesis is as easy as filling in this coupon.

- ☐ I would like more information on Genesis.
- ☐ I would like more information on Microstat
- ☐ I would like the name of my local dealer.
- ☐ I would like to attend a free seminar.

Name _____

Address _____

_____ Postcode _____

Telephone _____

Cerebral Solutions
No. 2, 281-285 Pacific Highway
North Sydney, NSW 2060 Phone (02) 923 2288

Dealer enquiries welcome

to correct or ignore the error, as appropriate, and take any necessary action to correct consequential errors.

For example, we could start with Listing 2. But this already makes things look very cumbersome. While it's OK as far as it goes—which isn't very far—it's time to rethink.

Firstly, lines 2030 and 2050 are going to have to make fairly complex decisions as to what to do with data already processed and written into FILENAME.THREE$.

Secondly, there is a lot of almost duplicated code in lines 2060 to 2080. Can this be reduced?

Thirdly, we have run smack into a major problem. We are in the middle of an error trapping routine. *We can not trap any errors generated in this section* as all errors detected in an error trapping routine are terminal.

Since we are inputting data in our error trapping routine, we are asking for trouble. As trouble is what we are trying to avoid, different methods must be adopted.

The solution, in principle, is easy. *Trap your errors at source, that is at the moment of first entry into the computer.* This is the first, and most important, law of data processing. Garbage, once admitted, wreaks havoc out of all proportion to the effort required to filter it out in the first place. So, what can be caught at source? The obvious thing to check is if the file name format is correct —and also check to see if the file already exists, otherwise something important might be overwritten.

Let's start again with a clean slate and delete the whole error trapping attempt.

The NAME <old filename> AS <new filename> command can be used to check the file name format. The NAME command demands that <old.filename> exists and that <new.filename> doesn't. If this is not so, then useful ERR messages are generated. Using our example, insert the lines shown in Fig 2.

By introducing a new variable — WRONG.FILE$ — at this stage we can cut down the code needed in our error trapping routine.

Logically we ought to check first for correct file name format (Fig 3).

We are getting tidier, but unfortunately since ERL is a reserved variable we cannot use the syntax RESUME ERL-10 so we have to cheat (Fig 4).

Looks OK? Well, it's not! This is a classic trap for the unwary, perhaps it should be called the 'cascading IF syndrome'.

It's not the logic that's at fault but the syntax. What happens is that if the test for the first part of line 2030 fails, then *the rest of the line is ignored.*

The answer is to write each 'IF' test as a separate line, or include the 'ELSE' test and make sure that all the tests are nested correctly. This is the method I prefer, so what we should have written is shown in Fig 5.

If we then get a bad file format typed in we are forced straight back into the input routine, until we have input an acceptable format.

Two of our files are input files and as such it is necessary that they exist. The third file is an output file and if it doesn't exist, then the interpreter will create it

```
2010  IF  ERR=64
          THEN PRINT WRONG.FILE$;" is in the wrong format ! " :
               IF ERL=130
                  THEN RESUME 120
                  ELSE IF ERL=150
                           THEN RESUME 140
                           ELSE IF ERL=170
                                    THEN RESUME 160
```

Fig 5

```
2000  REM ****** Error Trapping ******
2010  IF  (ERR=53) AND (ERL=1010)
          THEN PRINT "Can't find "+FILENAME.TWO$,
                     "Please re-enter ";:
               INPUT ; FILENAME.TWO$ : RESUME
2020  IF  (ERR=53) AND (ERL=1530)
          THEN PRINT "Can't find "+FILENAME.FOUR$,
                     "Please re-enter ";:
               INPUT ; FILENAME.FOUR$ : RESUME
2030  IF  (ERR=61) OR (ERR=67)
          THEN PRINT "No room on the disk ! "
               PRINT "Insert name of file to delete ";:
               INPUT ; FILE.TO.DELETE$
               KILL FILE.TO.DELETE$ : RESUME
2040  IF  (ERR=13) AND (ERL=1040)
          THEN PRINT "Can't recognise this data ! ":
               PRINT "Is ";FILENAME.TWO$;" the right file? ";:
               INPUT(1) ; ANSWER$ :
               IF ANSWER$ = "Y"
                  THEN PRINT "Data is corrupt" : END
               ELSE<get the right filename,
                    correct mistakes so far &
                    resume>
2050  IF  (ERR=13) AND (ERL=1530)
          THEN PRINT "Can't recognise this data ! ":
               PRINT "Is ",FILENAME.FOUR$;" the right file ? ";:
               INPUT (1); ANSWER$.
               IF ANSWER$= "Y"
                  THEN PRINT "Data is corrupt" : END
                  ELSE <get the right filename,
                        correct mistakes so far &
                        resume>
2060  IF  ERR=58 THEN KILL "OLDDATA.BAK"
2070  IF  (ERR=64) AND (ERL=1010)
          THEN PRINT FILENAME.TWO$;" is the wrong format " :
               PRINT "Please re-enter ";:
          INPUT FILENAME.TWO$ : RESUME
2080  IF  (ERR=64) AND (ERL=1020)
          THEN PRINT FILENAME.THREE$;" is the wrong format "
               PRINT "Please re-enter ";:
               INPUT FILENAME.THREE$ : RESUME
2090  IF  (ERR=64) AND (ERL=1510)
          THEN PRINT FILENAME.FOUR$;" is the wrong format " :
               PRINT "Please re-enter ";:
               INPUT FILENAME.FOUR$ : RESUME
```

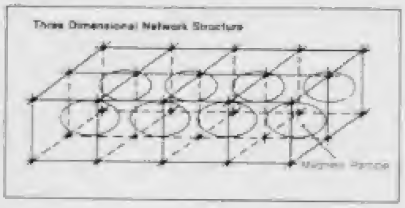
Listing 2

FUJI FILM FLOPPY DISKS

BRING PEOPLE, INFORMATION AND MEDIA TOGETHER

RD Binder System.
The RD (reliable and durable) Binder System—developed under FUJI FILM's own technology—is what gives FUJI FILM floppy disks their incredible toughness and stability. It acts as the adhesive which binds the magnetic particles together and to the tape base. The system ensures uniform dispersion of the magnetic particles using a "Three Dimensional Network Structure".

Our disks provide greater durability during repeated use, and are weather-proofed, ensuring peak performance even under severe environmental conditions



Contact Your Local Supplier

SYDNEY: C.A.E. Electronics 621 4242, Calmar Distributors 660 2499, Caringbah Computer Centre 526 1515 Empire Office Supplies 560 4444, JBN Data Products 605 8698 Manly Stationary Supplies 938 2522, R.I.O. Distributing 399-9900, Transcript 764 2177, BATHURST: Bathurst Computer Service (063) 31 3964, DUBBO: Orana Cash Registers (063) 82 5833, WOLLONGONG: Business & Leisure (042) 29 9744 MELBOURNE: Goodman Cannington 241 1341, Output Media 544 4400 GEELONG: Systems Stationary (052) 22 2844, BRISBANE: The Byte Shop 371 0711, Data 3 Office Centre 221 5588, Servatronics 341 5340, ADELAIDE: Australian Business Machine Co 212 3244, PERTH: W.K. Writt 446 6100.

Trade Enquiries Fujimex (02) 938 0241

WESTERN TECHNOLOGY

Shop 3 — 2 Clark Terrace, Seaton, S.A. 5023
Tel. (08) 45 8777

IBM-PC Compatible Computers and Cards

		Tax Exempt	Tax Incl.
ASI102	— Aquarius PC — 16 Bit Personal Computer 128K. IBM Compatible, Superboard, Twin Drives	$1995.00	$2299.00
ASI603	— Aquarius PC — 16 Bit Personal Computer 256K. IBM Compatible Dual 327K. Drives	$2295.00	$2699.00
ASI604	— Aquarius PC — 16 Bit Personal Computer 256K. IBM Compatible 327K. Drive and 10 Mbyte. Hard Disk	$3950.00	$4740.00
CGB001	— Colour/Graphics Board NTSC and RGB output, RS120, Light Pen Interface	$ 375.00	$ 445.00
MGB001	— Monochrome/Graphics Board high resolution, graphic capability, single parallel port	$ 375.00	$ 445.00
SDD541	— Slimline Disk Drive, Double Sided, Double Density 327K. Formatted	$ 325.00	$ 385.00
DCB541	— Disk Drive Controller Board	$ 135.00	$ 155.00
HSA712	— 10 Megabyte Winchester Hard Disk, Slimline	$1450.00	$1725.00
HDA001	— Hard Disk Adaptor, Connects Winchester Drive and CPU, controls maximum two 5.25" hard disks	$ 600.00	$ 720.00
MFB256	— Multifunction Board with 256K. Ram, RS232 port, parallel port and real time clock	$ 520.00	$ 625.00
RM512	— 512K. Ram Expansion Board	$ 595.00	$ 720.00
GMB001	— Games I/O Board	$ 65.00	$ 77.00
JYS612	— IBM Compatible Joystick, auto centering switchable	$ 45.00	$ 55.00
SPS135	— Switching Power Supply — cooling fan built in, 135 Watts	$ 160.00	$ 190.00
AKI600	— IBM Compatible Keyboard, Detachable, ASCII, rated 50 million Keystrokes, 10 Function Keys etc.	$ 195.00	$ 235.00

Monitors

	Tax Exempt	Tax Incl.			
Kaga Green/Amber 12" Monitor	$ 195.00	$ 220.00	Zenith Green/Amber 12" Monitor	$ 195.00	$ 220.00
Kaga Denshi RGB Monitor Type 1	$ 440.00	$ 500.00	Kaga Denshi RGB Monitor Type 2	$ 550.00	$ 620.00
Kaga Denshi RGB Monitor Type 3	$ 750.00	$ 875.00	Kaga Denshi RGB Interface	$ 30.00	$ 35.00

Printers

DT80/2-DT100	— 80 Column Printer 100cps Friction/Tractor/Graphics	$ 345.00	$ 415.00
P88/2-FT5002	— 80 Column Printer 100cps N.L.Q., Proportional Friction/Tractor/Graphics	$ 399.00	$ 460.00
Star Gemini 10X	— 80 Column Printer 120cps Friction/Tractor/Graphics	$ 440.00	$ 530.00
C. Itoh 8510 BPI	— 80 Column Printer Friction/Tractor Feed 120cps Graphics	$ 625.00	$ 790.00
Printer cable		$ 35.00	$ 40.00

Software Specials

DBase II	$ 450.00	$ 450.00	DBase III	$ 640.00	$ 640.00
Lotus 1.2.3	$ 585.00	$ 585.00	Lotus Symphony	$ 785.00	$ 785.00
Multimate	$ 390.00	$ 390.00	Wordstar Professional	$ 595.00	$ 595.00
Electric Desk	$ 425.00	$ 425.00	Supercalc III	$ 375.00	$ 375.00

Diskettes

DX-050 Diskette Box — 50 Disks Cap.	$ 25.00	$ 30.00	DX-085 Diskette Box — Capacity 85	$ 34.60	$ 41.50
Diskettes (Per Box 10) — Le Disc	$ 29.00	$ 34.00	Diskettes (Per Box 10) — Xidex	$ 32.00	$ 38.00

TERMS — PAYMENT WITH ORDER — BANKCARD WELCOME

```
2020  IF  ERR=53
          THEN IF ERL=150
                  THEN RESUME NEXT
                  ELSE PRINT WRONG.FILE$;
                            " doesn't exist, try again " ;
                       IF ERL=130
                         THEN RESUME 120
                         ELSE IF ERL=170
                                 THEN RESUME 160
2030  IF  ERR=58
          THEN IF ERL=150
                  THEN PRINT WRONG.FILE$;
                       "already exists, Overwrite ? "; :
                       GOSUB <get yes no> :
                       IF <yes>
                         THEN RESUME NEXT
                         ELSE RESUME 140
                  ELSE RESUME NEXT
```

Fig 6

```
2100  REM ****** GET YES NO ******
2110  ANSWER$ = INKEY$ : IF ANSWER$ = "" THEN 2110
2120  ANSWER$ = CHR$(ASC(ANSWER$) AND &H5F) ' upper-case
2130  RETURN
line 2030 then becomes
2030  IF ERR=58
          THEN IF ERL=150
                  THEN PRINT WRONG.FILE$;
                            "already exists, Overwrite ? ";
                       GOSUB 2100 : IF ANSWER$ = "Y"
                                      THEN RESUME NEXT
                                      ELSE RESUME 140
                  ELSE RESUME NEXT
```

Fig 7

for us as line 1020 is executed. This could also lead to a problem as it may result in a file being overwritten accidentally. Fortunately, we already have enough ERR information to avoid this and to check for file existence/duplication.

Note that because of the complexity a GOSUB has been introduced into the error-trap to get a yes/no answer. It will often be necessary to use subroutines in error trapping. Fig 7 shows how to write the program.

Here is an example of the use of the RESUME NEXT syntax. In this case, if we'd answered 'Y' to the overwrite question, then RESUME would have left the program in an infinite loop on the error line, but we have chosen to disregard the error and continue with the next statement.

There is an important point here regarding the use of the GOSUB. Routines that require additional keyboard input should be used sparingly in error trapping. The reason is that once in an ON ERROR routine all subsequent error trapping is disabled, until a RESUME command has been issued. In this case we are only looking for a one character input and so can use INKEY$ with safety. If more complex data needs to be input, then beware! The picture is looking clearer now but we still have to rewrite the sections checking for Disk/Directory full errors and look at the problem of Type Mismatch errors.

To solve the Disk/Directory full problem, it is necessary to give the error routine the capability to delete a disk file to make room. This can be a dangerous thing to do in its own right, so we need to be able to 'protect' important files against erasure.

A simple way to do this is to draw up a list of files that you are *not allowed* to erase, and to compare the erasure request with this list using the INSTR command to search the list (Fig 8) where 2200 is the deletion routine.

We are still not home and dry as END

```
2200  REM ****** Delete a file routine ******
2210  OLD.ERL=ERL ' remember original ERL to enable correct return to main program
2220  ON ERROR GOTO 2300
2230  PROTECTED.FILE.LIST$ = "<file1file2 . . . file99>"
2240  PRINT "Input name of file to delete";
2250  INPUT FILE.TO.DELETE$
2260  IF  INSTR(PROTECTED.FILE.LIST$,FILE.TO.DELETE$) > 1
          THEN PRINT "Protected file — try again "; :
               GOTO 2240
2270  KILL FILE.TO.DELETE$
2280  ' now we have to get back to the main program we can't use ERL because we may have generated a new one
      since entering this routine
2290  IF  OLD.ERL=1020
          THEN GOTO 1020
          ELSE IF OLD.ERL=1060
                  THEN GOTO 1060
2300  REM delete a file error trapping
2310  IF  (ERR=53) OR (ERR=64)
      .   THEN PRINT "No such file — try again "; :
               RESUME 2240.
2320  IF  (ERR=55)
          THEN PRINT "Can't delete that one, try again "; :
```

Listing 3

```
2040  IF  (ERR=61) OR (ERR=67)
          THEN PRINT "Disk is full. Delete a file ? ";
               GOSUB 2100 : IF ANSWER$ = "Y"
                                THEN RESUME 2200
                                ELSE END
```

Fig 8

could leave us with files of indeterminate content. In other words the disk might fill half way through writing the file and we might choose not to delete. If this happens we will have a file — FILENAME.THREE$ but no means of telling how many records have been written. Whether or not this is critical will depend on your application. I would DELETE the partially written file, take a new disk and re-run the whole program.

Why, you may ask, can't you GOSUB 2200? You could, but remember that in an error trapping subroutine, error trapping is disabled . . . we must issue a resume first to re-enable (Listing 3).

Conclusion

These examples of the right — and wrong — approaches to validation should ease a few programming problems, although the routines obviously still need some work. More importantly, some general points can now be made about error trapping.

Firstly, *always* use a RESUME to get back into the main program or any of its other subroutines. If you are in a subroutine and an error is detected which requires you to RETURN to the main program, then *don't just issue a <return> command*. The command will be obeyed but the whole error trapping system will be disabled, and the subroutine Stack may behave in an unexpected manner. The correct answer is to RESUME at the line number at the end of the subroutine you are in.

Secondly, it's good practice to end all the error trapping tests with the command.

ON ERROR GOTO 0

which will terminate and print any error not allowed for. This then becomes a 'safety-net' to catch errors for which recovery is not possible or practical.

Thirdly, error trapping can quickly degenerate into a spaghetti-like shambles of GOTOs. Since proper structuring is almost impossible to achieve, it pays to keep the traps modular, small and close to the source of trouble, if possible. It may mean duplicating code but it's usually worth it.

TJ'S WORKSHOP

Our monthly pot-pourri of hardware and software tips for popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', 77 Glenhuntly Road, Elwood, Victoria 3184. Please keep your contributions as concise as possible. APC can accept no responsibility for any damage caused by using these tips, and readers should be advised that hardware modifications may render the maker's guarantee invalid.

VIC 20 CONTROLLER

This VIC controller program may be the answer to many problems, as well as an innovative way of achieving new screen displays.

It effectively gives you two VIC chips: one operating on top of the screen, the other on the bottom. The changeover point can be altered, as shown in the first demo program. This sets up the system, and sets two different screen and border colours, but because of the routine they both appear onscreen at the same time, one in the bottom half, the other in the top.

The program then alters the changeover point. The second demo program turns on just one sprite, but shows that it's displayed twice by the swapping of the registers.

To use the routine, issue the SYS command as in the demo files, then treat the two areas of memory (defined as VIC1 & VIC2) as the normal VIC chip. VIC + 32 is the usual address of the border colour. To set the border colour of the top of the screen, just use VIC1 + 32 in place of VIC + 32. For the bottom of the screen use VIC + 32.

The changeover point can be changed: for example, allowing a small text screen at the bottom and a large hi-res screen at the top. It's best to play about with the demo programs to get the feel of the system, then to write your own program. Don't forget to run the loader program first to load in the control code.

Steve Mehew

```
10 REM VIC CONTROLLER BASIC LOADER.
20 REM (C) STEVE MEHEW 1984.
30 :
40 S=49152:E=49332
50 FOR R=S TO E:READ A:POKE R,A:NEXT
60 PRINT"DATA COMPLETE.":END
70 :
400 DATA 32,45,192,120,169,60,141,20
405 DATA 3,169,192,141,21,3,169,200
410 DATA 141,18,208,173,17,208,41,127
415 DATA 141,17,208,169,127,141,13,220
420 DATA 173,13,220,173,26,208,9,1
425 DATA 141,26,208,88,96,162,46,189
430 DATA 0,208,157,0,206,157,0,205
435 DATA 202,16,244,96,162,17,189,0
440 DATA 206,157,0,208,202,16,247,162
445 DATA 21,189,0,206,157,0,200,232
450 DATA 224,25,208,245,162,27,189,0
455 DATA 206,157,0,208,232,224,47,208
460 DATA 245,169,120,141,20
465 DATA 3,169,192,141,21,3,169,251
470 DATA 141,18,208,169,1,141,25,208
475 DATA 76,188,254,162,17,189,0,205
480 DATA 157,0,208,202,16,247,162,21
485 DATA 189,0,205,157,0,208,232,224
490 DATA 25,208,245,162,27,189,0,205
495 DATA 157,0,208,232,224,47,208,245
500 DATA 169,60,141,20,3,169,192,141
505 DATA 21,3,169,200,141,18,208,169
510 DATA 1,141,25,208,76,49,234,202

READY.

100 REM TEST PROGRAM FOR CONTROLER 1
110 :
120 REM WRITTEN BY STEVE MEHEW --- 1984
130 :
140 V1=52736:REM PSEUDO VIC #1
150 V2=52480:REM PSEUDO VIC #2
155 VA=49320
160 :
170 SYS 49152:REM START ROUTINE
180 POKE V2+32,0
190 POKE V1+33,0
195 GOSUB 400
200 :
210 FOR LINE=70 TO 230
220 POKE VA,LINE
240 NEXT
250 :
260 FOR LINE=230 TO 70 STEP-1
270 POKE VA,LINE
290 NEXT
300 :
310 GOTO 210
320 :
400 PRINTCHR$(147):PRINT
410 PRINT"WATCH THE SPLIT LINE MOVE..."
430 RETURN

READY.

100 REM TEST PROGRAM FOR CONTROLER 2.
110 :
120 REM WRITTEN BY STEVE MEHEW -- 1984
130 :
140 V1 = 52736
150 V2 = 52480
155 VA = 49320
160 :
170 SYS 49152:REM START ROUTINE
180 :
190 REM SET UP SPRITE (ONLY ONE !!!)
200 POKE V1,100:REM X COORD
210 POKE V1+1,200:REM Y COORD
220 REM POSITION ONE SPRITE AT 100,200
230 POKE V1+39,1:REM COLOUR=WHITE
240 REM
250 POKE V2,100
```

```
260 POKE V2+1,100
270 POKE V2+39,1
280 REM
290 POKE V1+21,1:POKE V2+21,1
291 REM ABOVE SHOWS ONLY ONE SPRITE
292 REM IS ACTUALLY TURNED ON.
300 REM
310 POKE VA,150:REM SWITCH AT LINE 150
320 REM
330 POKE 2040,13
340 FORR=0TO62:POKE 832+R,192:NEXT
350 REM
360 POKE V1+16,0:POKE V2+16,0
370 END

READY.
```

ATARI OUTPUT DEVICE

This subroutine allows you to change the Atari's standard output device (the standard output is where all system messages, PRINT statements, and so on appear, and normally this is the screen). With this subroutine, you can specify another device (usually a printer) and save yourself the bother of writing everything twice using PRINT &LPRINT. The routine will work regardless of operating system, or even if you have superseded the normal device driver by adding a new device handler.

Simply type STDOUT$ = "P:" or STDOUT$ = "E:" (depending on whether you want printer or screen output), then GOSUB 10000. Everything will be then sent to the chosen device.

```
10 DIM STDOUT$(2):
   REM DECLARE THE
   STRING FOR USE
   THROUGHOUT THE
   MAIN PROGRAM
   AND IN THE
   SUBROUTINE ITSELF
        .
        .
        .
   MAIN PROGRAM
        .
        .

10000 FOR DEVICE = 830
   TO 794 STEP -3: IF
   PEEK (DEVICE) = ASC
   (STDOUT$) THEN
   HANDLER = PEEK
   (DEVICE + 1) +256 *
   (PEEK (DEVICE + 2)):
   POP: GOTO 10020
10010 NEXT DEVICE: PRINT
   "NO SUCH DEVICE":
   RETURN
10020 POKE 838, PEEK
   (HANDLER + 6):
   POKE 839, PEEK
   (HANDLER + 7):
   RETURN
```

F O'Dwyer

COMMODORE 64 PRINT AT

The use of cursor controls within a print statement on the Commodore 64 allows flexible use of printing, but inevitably results in statements containing large numbers of cursor control characters which are almost impossible to read on a printer. What is needed is a PRINT AT command, which is provided on some machines such as the Tandy.

Here is a short machine code routine (only 29 bytes long) which is accessed by a SYS call, followed by the x coordinate (0-39) and the y coordinate (0-24). 0,0 is the top left-hand corner.

The routine is fully relocatable, and by letting the variable AT be the address of the routine in memory, the call is easy to read and understand. For example: SYS AT,x,y: PRINT B$

The program is split into two parts: the first loads the routine at address ADDR; and the second is a very short demonstration showing the command's ease of use.

This routine does not affect the print routine at all.

The routine

```
10 REM M/C PRINT AT
   ROUTINE
20 ADDR = 10000
30 COUNTER = 0
40 FOR T = ADDR TO
      ADDR + 28
50 :READ D: POKE T,D:
      COUNTER =
      COUNTER + D
60 NEXT T
70 IF COUNTER < > 3857
   THEN STOP
80 DATA 32, 253, 174, 32,
   138, 173, 32, 247, 183,
   152, 72, 32, 253, 174, 32,
   138, 173
90 DATA 32, 247, 183, 166,
   20, 104, 168, 24, 32, 240,
   255, 96
100 REM DEMO
110 AT = ADDR
120 PRINT "(CLR/HOME)"
130 SYS AT, 16, 12: PRINT
      "SCROFF"
```

D Gristwood

SPECTRUM DRAW TO

One problem with producing graphics on the Spectrum is its lack of a DRAW TO command. Calculating and plotting each point is unnecessary and time-consuming, so I've written a simple routine to make it easier.

After the code has been typed in using the short program in Listing 1

RANDOMIZE USR 32000 will create a line from the last point plotted to the new point specified by the following POKEs:

POKE 32007—x coordinate
POKE 32027—y coordinate

You can initialise the graphics cursor by POKEing the system variable COORDS:

POKE 23677,x
POKE 23678,y

Listing 2 is an example program of the routine in use, showing the amount of time it saves.

Listing 1

```
10 FOR n=32000 TO 32049
20 READ po
30 POKE n,po
40 NEXT n
50 DATA 217,229,217,33,125,92,
62,250,150,79,30,1,210,23,125,30
,255,126,33,7,125,150,79,33,126,
92,62,69,150,71,22,1,210,43,125,
22,255,126,33,27,125,150,71,205,
186,36,217,225,217,201
```

Listing 2

```
1 REM Demonstration
2 REM
3 LOAD ""CODE
4 REM
5 LET step=1
6 LET graph=1000
7 LET a$="Using PLOT"
8 REM
10 FOR f=1 TO 2
15 PAUSE 30: CLS
20 POKE 23677,0
```

SOFTWARE
15% OFF
INCLUDES R BASE
LOTUS 1.2.3

C64 GAMES $10

LOOK!

PRICES YOU USED TO DREAM ABOUT

XIDEX

5¼" SSDD 5012	36
5¼" DSDD 5022	45
8" SSDD 8012	49
8" DSDD 8022	53
5¼" SSDD 5014 BULK-NO BOX	29
5¼" DSDD 5024 BULK-NO BOX	38

QUALITY XIDEX ARE AN OVERSPEC DISK DESIGNED FOR CRITICAL DATA APPLICATIONS. DETAILS OF FULL RANGE OR SPECS CALL US.

APPLE BARGAINS

Software

BUSINESS FORECAST MODEL	80
DESK TOP PLAN II	178
VISIDEX	178
VISIFILE	178
VISIPLOT	143
VISISCHED II	220
GRAPHMAGIC	64
HOW TO USE IIE	45
HOW TO OPERATE IIE	38
PFS SERIES	Each 146
BANK ST WRITER II+/E/C	87
ZARDAX	270
AIRSIM III	62
SPITFIRE SIMULATOR	51
FLIGHT SIMULATOR II	72
KOALA PAD - APPLE	148!

PRINTER RIBBONS

EPSON MX80	9.38
EPSON MX100	15.38
SP80 EPS LOOKALIKE	15.00
COMMODORE MT80	15.00
TANDY LP6 & LP8	6.38

OTHERS CALL

Datalife
by Verbatim

5¼" SSDD 525-01 *30!*

HEAD CLEANING

5" KIT	10 EA
8" KIT	
5" C/DISKS	2 EA
8" C/DISKS	

DISK STORAGE

Australian Made!
TOP QUALITY

DISK MINDER

Brown or beige base, smoke-tinted cover, Aussie-made lock with REPLACEABLE keys
Holds 60 diskettes

21!

Swedish made ABA storage (Volvo quality)

40 x 5" disks	25
90 x 5"	40
40 x 8"	40
90 x 8"	58

CONTROL DATA

5¼" SSDD *28!!*

LABELLING

WARNE'S WIP 'N WRITE LABELS REUSABLE, JUST WIPE WITH DAMP TISSUE. SPECIAL PEN

45 LABELS & PEN

DW5 - FOR 5" DISKS	10.13
DW7 - FOR 8" DISKS	14.10

FREE CATALOGUE!
C64 ATARI TI APPLE
IBM MAC CP/M MSDOS
MICROWARE

3.5" Sony MICRO DISKS

S/SIDE D3320 8 EA 69 TEN

D/SIDE D4440 10 EA 89 TEN

MAC SOFT

DB MASTER	288
FILEVISION	222
HELIX	450
MAC MANAGER	64
MAIN ST FILER	238
MULTIPLAN	228
PFS FILE	162
PFS REPORT	162
PFS FILE/REPORT	258
PROF MUSIC COMPOSER	522
THINKTANK	168
CLICKART	56
MAC THE KNIFE	51
DEADLINE	80
DOLLARS & SENSE	144
HOME ACCOUNTANT	118
LEGACY	64
ZORK I	56
ZORK II, III EA.	71

LOOK!

TOP 10 II+/e/c

1 • **Flight Simulator II**- Put yourself in the seat of a Piper 181 Cherokee and reach for the sky. High-speed colour 3-D graphics give a great view as you practice takeoffs, landings and aerobatics over New York. Then try the aerial battle game A-1 documention.

	RETAIL	YOU PAY
2 • Bank St Writer	$79.95	$72
3 • Wizardry	$99.95	$83
4 • Lode Runner	$79.95	$68
5 • Championship Lode R	$49.95	$42
6 • Crossword Magic	$49.95	$42
7 • Mastertype	$84.95	$71
8 • Suspended	$59.95	$49
9 • Printshop	$74.95	$62
10 • Zaxxon	$59.95	$50

MAC TOP 10

	RETAIL	YOU PAY
1 • Fireroom	$275	$231
2 • Transylvania	$49.95	$58
3 • Main St Filer	$299	$248
4 • PFS File	$205	$168
5 • Mac Coach		
6 • PFS Report	$205	$168
7 • Megamerge	$210	$175
8 • Think Tank	$210	$175
9 • PFS Bundle	$320	$268
10 • Mac the Knife	$64.95	$54

3.5" microfloppies $8 ea $69 ten

KAGA green KX1201	$285	$229
KAGA amber KX1203	$299	$245
KAGA col Vision III	$565	$452
Logitec 120 printer (Star 120cps)	$539	$349
Logitec 200 printer (200cps)	$1860	$980
Verbatim 5" or 8" clear/kit	$12.70	$10
Verbatim 5" or 8" clear/disks	$2.50	$2

RIBBONS - C-Itoh 8510 $8.25; Epx MX80 $9.38 MX100 $13.58; TRS LP6/8 $6.38; SP80 $14

BUY AUSTRALIAN MADE
AND KEEP YOUR JOB!

Zardax II+/e/c	$220	$169
SWS-1 Storage Box holds sixty 5" hinged perspex top dividers	$29	$21
Control Data 5" SSDD	$33.95	$25 ten
Xidex bulk plain label no box —		
5" SSDD 5014	$43.50	$29
5" DSDD 5024	$51.50	$38
Xidex standard 5012 5" SSDD	$54.50	$36
Xidex standard 5022 5" DSDD	$59.60	$45
Xidex standard 5" DSDD 96Tk	$71.20	$59
Xidex standard 8012 8" SSDD	$61.40	$49

C64 ATARI IBM CP/M OWNERS - call for your top 10 lists
All micro owners call 008 for bargain bulletins

FREIGHT
SOFTWARE $2 ANY ORDER
DISKETTES $2 PER 10
DISK STORAGE BOXES $3
RIBBONS, CLEANING KITS, WIPE 'N WRITES $1
MAWAREX $2
MAXIMUM FREIGHT $5 — SENT O'NITE COURIER

ORDERING INFORMATION
CHEQUES, MONEY ORDERS TO 'IMMEDIA'
NO STAMP NEEDED FOR OUR FREEPOST ADDRESS
SCHOOL PURCHASE ORDERS WELCOME
AUST WIDE COURIER - PAY $5 FREIGHT

ALL PRICES TAX INCL

NO CHARGE FOR CREDIT CARDS

BANK VISA MASTER

immedia

BOOKS COMPUTER EDUCATION
FREE POST 3AP
IMMEDIA SOFT
8 LYNDHURST ST, DUDLEY 2290

NATIONAL ORDER DESK 7D/8AM-8PM
STD FREE

008-025-241

BUSINESS & LOCALS CALL
(049) 497-546

```
 30 POKE 23678,80
 40 PRINT a$
 50 FOR x=0 TO 255 STEP step
 60 LET y=80+75*SIN (x/128*PI)
 70 GO SUB graph
 80 NEXT x
 85 REM
 90 LET step=10
 95 LET graph=500
 96 LET a$="Using DRAW TO"
 97 REM
 98 NEXT f
101 STOP
102 REM
500 POKE 32007,x
510 POKE 32027,y
520 RANDOMIZE USR 32000
530 RETURN
600 REM
1000 PLOT x,y
1001 RETURN
```

```
,6,1,2,1,5,1,6,2,5,2,6,5,6,8,8
```

INVERSE FILENAMES

This tip might be useful to Apple owners who want inverse or flashing filenames in disk catalogues, as saving or renaming a file in inverse or flashing mode does not work. ("HELLO" as used here is an example only, the routine will work with any legal filename.)

First type INVERSE : PRINT "HELLO" : NORMAL <RETURN>

This will print an inverse HELLO on the screen.

Now type RENAME HELLO,

Before pressing return, use <ESC> and the cursor keys to position the cursor at the start of the inverse HELLO. Press <ESC> again, then go over the inverse HELLO and press <RETURN>. The file should now appear in inverse on the disk catalogue. This also works with FLASH.

Here are some other useful hints:

CALL 62454 clears the high-res screen 1 to the last plotted colour; CALL -1998 clears text page 1 to inverted a's; CALL -1994 clears top 20 lines to inverted a's; POKE 43624,D is an easy way to change the current disk drive from within a program where D is the appropriate drive number. Be sure to use valid numbers.

G Mountain

EXTRA HCOLORS FOR APPLE

An extra six HCOLORs can be obtained on the HIRES screen by "mixing" certain standard HCOLORs. This is done by plotting different coloured horizontal lines on alternate rows. Except for black and white, all the other HCOLORs can be "mixed" together. eg. Mixing purple and red as in the diagram will give a magenta color.

The following program will display all twelve HCOLORs. *G Lau*

```
10  REM *** HCOLOR MIXER  **
20  REM *** BY GEORGE LAU **
30  HOME : HGR
40  READ A,B: IF A=8 THEN END
50  HCOLOR = A: FOR I =
    J TO J + 8 STEP 2
60  HPLOT 0,I TO 279,I: NEXT
70  HCOLOR = B: FOR I = J + 1
    TO J + 9 STEP 2
80  HPLOT 0,I TO 279,I: NEXT
90  VTAB 22: HTAB 1: PRINT
    "HCOLORS ";A;" AND ";B
100 PRINT "PRESS ANY KEY
    TO CONTINUE";
110 GET A$: J=J+12: GOTO 40
120 DATA 1,1,2,2,3,3,4,4,5,5,6
```

'BEE AUTO-START

In reply to M O'Connor's question published in the November issue of *APC*, yes, a Basic program can be made to auto-start on the MicroBee. All one needs is a little understanding of the Monitor in either the Terminal or WordBee ROM.

The solution is simply to go to the Monitor by pressing M & RESET at the same time for 1 second and then release the RESET key first. Then load your Basic program in with R <c/r>. What appears on the screen will look, for example, like:

```
NAME   B   08C0   1000 1000
```

The first number 08C0 in Hex is the program start address. The next 1000 Hex is the program length. Simply add these numbers together and subtract 1 (ie, 18BF). Then save the program from the Monitor by entering:

```
D  "NAME"  M  08C0  18BF  801E <c/r>
```

D	will Dump program at 1200 baud. Use W for 300 baud.
"NAME"	is the program name (max. six letters) between quotes.
M	to save as a machine language program.
08C0	is start address in Hex.
18BF	is end address in Hex.
801E	is jump address to auto start Basic programs.

When the above program is loaded-in as normal it will auto-start. If the first line of the program is:

00010 POKE 162,30: POKE 163,128: POKE 140,1

then the classroom "whizz kid" cannot stop the program with the BREAK key and it will always restart with a press of the RESET key. As many copies of the program as you like can be saved through the monitor as well.

A Laughton

ROYAL EASTER SHOW 1985

THE ROYAL AGRICULTURAL SOCIETY of N.S.W. SYDNEY

Computer Software Competition

The Royal Agricultural Society of N.S.W. with the support of a number of major suppliers in the data processing field, is introducing a computer software competition in conjunction with the 1985 Show.

The objectives of the competition are to present and publicise the best original programmes relating to rural, pastoral or agricultural activities and to encourage the development of computer skills particularly amongst those living outside the major metropolitan centres.

Prize winning entries and others considered of sufficient merit will be demonstrated in an appropriate environment at the Show.

The competition will be conducted in two Sections:

(i) programmes for rural/pastoral or agricultural management or other similar activities;
(ii) other programmes with a significant educational content, e.g. computer games.

Further information may be obtained by writing to

The Director
RAS of N.S.W.
Computer Software Competition
G.P.O. Box 4317
Sydney N.S.W. 2001
or by telephoning
Miss Carol Rowan on (02) 331 9122

TEACH YOURSELF LISP

Dick Pountain concludes his 'Teach Yourself' series with a look at the important fringe features of the language.

This month I'll examine several important but unrelated features of Lisp that haven't yet been covered.

First let's find out how to split the atom. Although Lisp is excellent for list processing, on the evidence so far presented it isn't much use with strings. Names have been treated as if they are atomic; they either exist or they don't but you can't get inside them.

Sometimes we *need* to break down a name into its individual letters; a good example is the extension of the MATCH function defined last month. I suggested that it would be interesting to use variables instead of * and ?, so that the matched values could be returned to us. In order to do this we need a scheme of variable naming so that the match variables can be distinguished from ordinary list elements. Using a $ as the first letter will suffice, as in:

(MATCH '($name likes $animal) '(fred likes tree-frogs))

which leaves 'name' equal to 'fred', and so on.

To recognise variables in such a scheme, we need a way to inspect the first letter of an atom. Most Lisp dialects have the dramatic-sounding functions EXPLODE and IMPLODE to accomplish this (sometimes they're called UNPACK and PACK, or IMPLODE may be called COMPRESS). EXPLODE applied to an atom returns a list of the letters in the atom:

(EXPLODE 'frog)
(f r o g)

Now we can use all the list processing we've learnt to manipulate the individual letters and stick them back together with IMPLODE, which takes a list of letters and returns an atom. Don't forget that neither function alters the orginal atom: a new atom is formed, and it's up to you whether to substitute it for the old one. The function we need can now be defined as shown in Fig 1, and we test the result to see if it's a $ to recognise variables in the match list.

Lisp is an excellent language for handling databases, and one of the chief reasons lies in a facility that we haven't used called the 'property list'. Without getting too far into the internal workings of Lisp, let's just say that every name which you define has associated with it a list called its property list. When a name is created, this list is empty. You can use the list to give named properties to an atom, just like the fields in a database record.

If we create a name FRED, it could have properties called, say, GENDER and HEIGHT which are quite independent of any value that FRED might have. In fact the value of a variable which we've been using so far is merely one of its properties, called the 'value property'. The value property is special because it has no name of its own: it's what is returned by Lisp when the name is evaluated, and it's altered by SETQ. Other user-defined properties are manipulated by the fuctions PUTPROP, GET and REMPROP.

PUTPROP puts a value onto the property list of a name under a property name which is one of its arguments. (PUTPROP 'FRED 'MALE 'GENDER) sets a property called GENDER to the value MALE. Some dialects might take the arguments to PUTPROP in a different order, so check your manual before experimenting.

We can read back such property values with GET:

(GET 'FRED 'GENDER)
MALE

REMPROP (from REMove PROPerty) removes a property from the list (not just its value but the whole thing), so (REMPROP 'FRED 'GENDER) leaves FRED in the fashionable state of being genderless.

I'm sure your imagination will tell you just how powerful this facility is. It provides a way of creating fully dyna-

```
(DEFINE FIRST-LETTER (NAME)
     (CAR (EXPLODE NAME))  )
```

Fig 1 Function to inspect an atom's first letter

```
(DEFINE KEEP-OBJECT (CHARACTER OBJECT)
     (PUTPROP CHARACTER
              (CONS OBJECT (GET CHARACTER 'POSSESSIONS))
              'POSSESSIONS ) )
```

Fig 2 List of POSSESSIONS property

```
(DEFINE REST-NAME (NAME)
     (IMPLODE (CDR (EXPLODE NAME))) )
```

Fig 3 Defining REST-NAME to FIRST-LETTER

```
(DEFINE MATCH (PATT LIST)
     (COND
          ((AND (NULL PATT)(NULL LIST)) T)
          ((OR  (NULL PATT)(NULL LIST)) NIL)
          ((OR  (EQUAL (CAR PATT) '?)
                (EQUAL (CAR PATT)(CAR LIST)) )
           (MATCH (CDR PATT)(CDR LIST)) ) ) )
```

Fig 4 First version of MATCH

```
((AND (EQUAL (FIRST-LET (CAR PATT)) '$)
      (MATCH (CDR PATT)(CDR LIST)) )
 (SETQ (REST-NAME (CAR PATT)) (CAR LIST) )  T)
```

Fig 5 Clause which checks for words beginning with $

mic databases whose record structure can be changed, pruned or expanded at anytime during a program run. There's no limit on the number of properties an atom can have, save that of memory space.

Let's suppose we're writing an adventure game in which characters pick up and drop possessions. Each character's name has a property called POSSESSIONS, which is a list of what they've picked up so far (Fig 2).

The character and object can be obtained from pattern-match variables. We'll start by defining a complementary function to FIRST-LETTER called REST-NAME (Fig 3), which returns a name with the first letter stripped off. Our MATCH function can now test the first letter to see if it's a $ (indicating we've found a match variable), then put values in the variables names (without the $) and these can be used by KEEP-OBJECT. Then perhaps we could do:

MATCH '($CHARACTER picks-up ? $OBJECT) (READ))

to analyse user input expressions such as 'Frodo picks up the Orc-Repellent', and have the Orc-Repellent added to Frodo's list of possessions.

For simplicity's sake, let's use the first version of MATCH which only used ? to match any single atom (Fig 4).

We need to add a new clause to the COND which checks for words beginning with $. If it finds one and if the rest of the lists match then we have a variable match, and we want to set the value of the variable to the matched word. A suitable clause appears in Fig 5.

But, unfortunately, this won't work. The SETQ expression will bomb out because its first argument isn't an atom. Remember that SETQ *doesn't evaluate* its first argument, so (REST-NAME . . . . is just so much garbage to it. What we need instead is the related function SET, which we haven't used before, that evaluates both its arguments. (SETQ is just a SET which quotes its first argument for you, which is usually what you want.) SET will evaluate the (REST-NAME . . . . expression and all is well. Test the new MATCH with Fig 6.

Try to extend this variable matching scheme to accept *variables which match any number of atoms (assigned as a list). You could also try using a PROG to read input lists, match things, and add the things to a property list like KEEP-OBJECT does.

The last major Lisp constructs I should mention are the mapping functions. A very common need in Lisp programming is to apply a function to each member of a list in turn and return a list of the results. It's perfectly possible to do this by writing a function as in Fig 7 to apply SQUARE to each element of a list of numbers. The disadvantage is that you'll have to write a new definition for each different function you want to apply in this way. We can make the definition general by passing the function to be applied as a second argument (Fig 8).

Used as in (DO-TO-ALL '(1 2 3) 'SQUARE), this will return the same answer, (1 4 9), as (SQUARE-ALL '(1 2 3)) does.

You may be worried by this cavalier passing of a function as an argument to another function, but Lisp is happy with it. In general, you may pass functions as arguments just as you pass numbers or lists. Complications can arise if the function passed uses variables which it doesn't bind itself, but some dialects provide a function FUNCTION which should be used instead of QUOTE when passing a functional argument, and this solves any problems.

Most Lisps provide the function MAPCAR (sometimes called MAPC) which does exactly the same thing as our DO-TO-ALL (warning: some dialects have the arguments to MAPCAR in reverse order—that is, function, list). The 'MAP' part refers to the mathematical notion of a 'mapping' rather than the everyday idea of a chart, although the two are connected.

Closely related to MAPCAR is the important function APPLY. APPLY also takes a function and a list as its arguments but instead of applying the function to each member of the list, it passes the list as multiple numeric arguments, rather than a single list argument, to the function. Take the example of PLUS which can (usually) accept any number of arguments, so (PLUS 1 2 3) is 6. If we tried to give PLUS a list of arguments, (PLUS '(1 2 3)), it wouldn't like it one bit. By using APPLY we can make it accept:

(APPLY 'PLUS '(1 2 3))

Think of it this way; APPLY takes the function and places it inside the brackets at the front of the list. APPLY is used in the inner workings of the Lisp interpreter, where multiple arguments are always represented by a list.

Don't worry if the difference between these functions doesn't sink in at once. You'll find that you only understand them properly when you use them to solve a programming problem.

As an example of their use, Fig 9 is a function which uses both APPLY and MAPCAR (a very common construction) to count all the atoms in a list.

This will only work if your PLUS can take more than two arguments, and will give an error with a single atom list. Do you know why?

Very often it would be handy to use APPLY or MAPCAR to apply a function that we're only going to use once. It isn't worth defining such a function with DEFINE and wasting valuable memory by giving it a name and permanent

```
(SETQ NAME NIL)
(SETQ EPITHET NIL)
(MATCH '($NAME IS A ? $EPITHET) '(RUDOLPH IS A BIG WALLY))
NAME
 RUDOLPH
EPITHET
 WALLY
```

Fig 6 Testing the new MATCH

```
(DEFINE SQUARE-ALL (LIST)
    (COND
          ((NULL LIST) NIL)
          (T (CONS (SQUARE (CAR LIST)) (SQ-ALL (CDR LIST))) ) ) )
```

Fig 7 Function to return a list of results

```
(DEFINE DO-TO-ALL (LIST FUN)
    (COND
          ((NULL LIST) NIL)
          (T (CONS (FUN (CAR LIST)) (DO-TO-ALL (CDR LIST))) ) ) )
```

Fig 8 Passing the function to be applied as a second argument

```
(DEFINE ATOMCOUNT (LIST)
     (COND ((NULL LIST) 0)
           ((ATOM LIST) 1)
           ( T (APPLY 'PLUS (MAPCAR LIST 'ATOMCOUNT))) ) )
```

Fig 9 Function using APPLY and MAPCAR to count all list atoms

More bytes

First shipment sold out in days . . .
So popular we've had to air-freight new stocks in . . .
The greatest value you'll ever see . . .

That's the new Bondwell 14 Portable computer: EXCLUSIVE to Dick Smith Electronics

Simply brilliant! That's the all-new Bondwell 14 portable personal computer. Small wonder it has become one of America's top-selling computers in just a few short months – and now the same thing is happening here in Australia.

It's everything you've ever wanted in a computer and much, much more besides: small enough to go anywhere with you, yet large enough to do virtually any computing job.

This incredibly powerful personal portable operates from the world-standard CP/M system: which means there will always be an incredibly large range of software available for it. For virtually any purpose.

That's if you **ever ever need** any other software: the Bondwell 14 comes with over $1200 worth of top quality business software (including Wordstar word processing!).

Look at what else you get:

- **Twin double density, double sided disk drives inbuilt (360K capacity each)**
- **9in amber screen inbuilt – for minimum glare and fatigue**
- **Standard parallel and twin RS-232C interfaces inbuilt**
- **16 user definable keys for incredibly easy use**
- **CP/M version 3.0 including a host of utility software – even a SPEECH synthesiser (it can read to you in English!)**
- **Ergonomically designed keyboard & durable cabinet for complete portability**
- **PLUS over all this famous Micropro bundled software: Wordstar, Calcstar, Mailmerge, Datastar, Reportstar – worth over $1200.00!**

Cat X-9000

OVER $1200 WORTH OF SOFTWARE FREE!

All this for only $2295

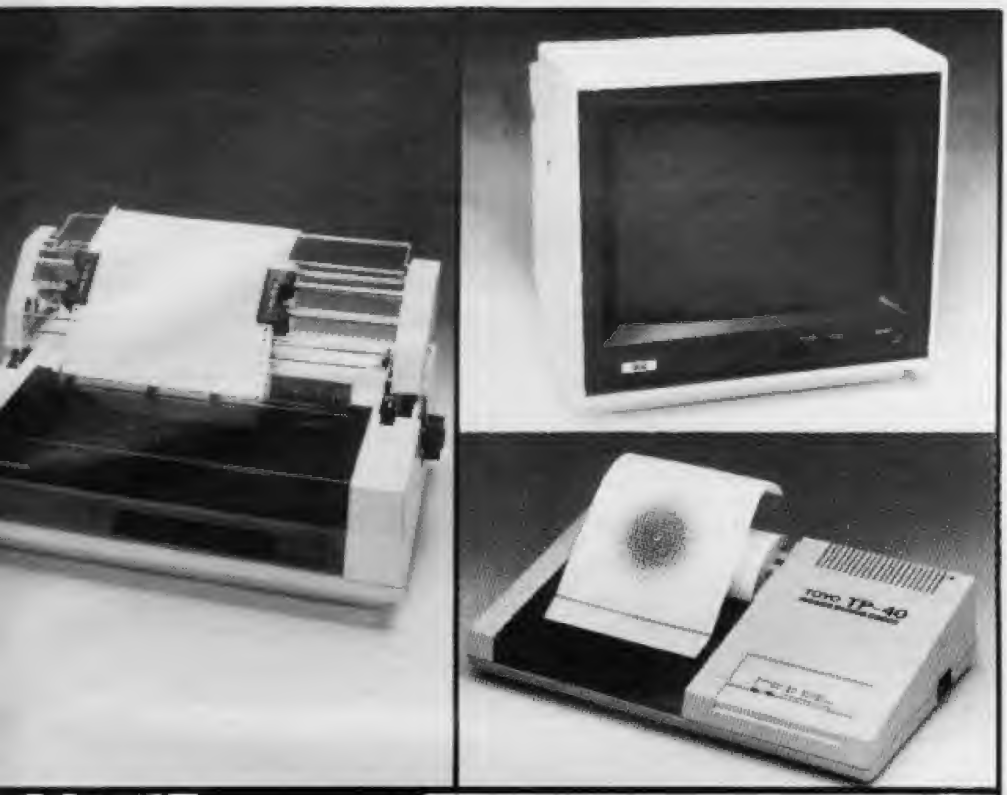
***Or from $233 deposit and $18.23 per week over 48 months to approved applicants. Commercial Leasing also available!**

Dick Smith Electronics Pty Ltd

COMPUTERSTORE

Your one stop computer shop at y

for your bucks!



Uchida Daisywheel Printer

Top quality printing at a budget price. Prints at 18 cps and offers a choice of 3 pitches plus proportional. Standard Centronics type interface.
Cat X-3270

Save $120
Now only $575

Tractor feed shown is optional (Cat X-3273 @ $99.50).

Quality Japanese Hi-Res Monitors

Green: X-1222
Amber: X-1227
$249 each

TP-40 Four Colour Printer Plotter

Incredible performance at a bargain price. Centronics type interface
Cat X-3245

LAST YEARS PRICE $229
Now only $99

Apple II software compatible CAT!

Australia's best value 64K Computer. That's the CAT. It's the best of both worlds: the very latest and most powerful hardware, plus the ability to run a very broad range of tried-and-proven software. If you want a machine which is software compatible with thousands of popular programs and which is supported by a reputable dealer, our CAT with emulator is good value. Check the CAT out at your nearest Dick Smith Electronics Computerstop. It purrs.

Save $232 on CAT system!

	Cat. No.	Normally
Basic CAT Computer	X-7500	$ 699.00
Disk Drive	X-7505/6	$ 349.00
Disk Controller	X-7510	$ 149.00
RF Modulator	X-7550	$ 34.90
		$1231.90

SPECIAL OFFER! VALUE AT ONLY $999

*Or $81 deposit and $8.31 per week over 48 months to approved applicants.

Dick Smith Electronics Pty Ltd

COMPUTERSTOP

earest Dick Smith Electronics Centre.

bankcard welcome here | MasterCard | Terms available to approved personal applicants through Custom Credit | VISA

A882

Electric Desk

An integrated multi-tasking productivity program that combines four business functions: word processing, database management, spreadsheet analysis, and communications. Electric Desk features a window function, a macroprogramming language, and context-sensitive help screens.

Database

- Instantaneous access to any record by index value
- Powerful search capability. Search criteria can include complex Boolean logic and wildcard search
- Automatically dials phone numbers with a single key stroke
- Maximum of 50 fields per record
- Maximum of 1000 characters per record and 1000 characters per field
- Maximum of 65,000 records per database
- Maximum of 5 index fields per database
- Record layout can be "painted" on the screen
- Data and field names can be displayed in normal, bold, underline, or reverse video
- Edit criteria can be defined to minimize entry errors
- Full screen editor to enter and change data
- Screen can be divided into windows
- Work on up to nine different databases simultaneously (system memory permitting)

Communications

- Log on two different information services or host computers simultaneously
- Divide the screen into windows
- Define keyboard macros to execute several commands with one key stroke
- User definable baud rate, parity, stop bit, and word length
- Log in scripts for automatically dialing host computers and information services and entering password information
- Send and receive ASCII files
- Edit files that have been received using the word processor

Word Processor

- Automatic line wrap
- Continuous reform of text as new text is inserted
- Paragraph indentation
- Search and replace
- Delete block of text
- Insert block of text
- Cut and paste
- Automatic chapter, table and page numbering
- Right justify text
- On-screen ruler, with user selected left, right, top and bottom margins, and tab stops
- Normal, bold, italics, bold italics and two user definable type styles
- Superscript and subscript
- Single line, double line, or triple line spacing
- User selected headers, footers and page numbering style
- Information from the spreadsheet and database can be merged into a document prepared using the word processor
- Keyboard macros can be defined to automatically type common phrases or execute several commands with one key
- Screen can be divided into windows
- Work on up to nine different documents simultaneously (system memory permitting)
- Move text from one document to another or from one window to another
- Move text from document to the spreadsheet
- Any ASCII file can be edited using the word processor

Spreadsheet

- 255 rows by 255 columns
- Variable column widths
- Edit, copy, delete, and move a cell or range of cells
- Insert or delete rows and columns
- Import ASCII files into the spreadsheet
- Overlay one spreadsheet on top of another spreadsheet
- Number formats: 0 to 6 decimal places, exponential and percent
- Label formats: Right, Left, and Center justification
- Cells can be protected to prevent accidental editing
- Spreadsheet titles can be locked so that they do not disappear from view when the spreadsheet is scrolled
- Vertical and horizontal windows (viewports) can be defined to view different portions of the same spreadsheet simultaneously
- Screen can be divided into windows
- Work on up to nine different spreadsheets simultaneously (system memory permitting)
- Embedded printing commands can be used to print out portions of the spreadsheet using different type styles
- Spreadsheet functions:

Mathematical Functions

ABS (x)	Absolute Value
EXP (x)	Exponential
INT (x)	Integer Part
LN (x)	Log base e
ROUND (x,n)	Round a number to n digits
SQRT	Square Root

Logical Functions

IF (condition, true value, false value)

Special Functions

CHOOSE (x, v0, v1,....vn)	Select argument value
HLOOKUP (x, range, row#)	Horizontal table lookup
VLOOKUP (x, range, col#)	Vertical table lookup

Financial Functions

IRR	Internal Rate of Return
NPV	Net Present Value
FV	Future Value
PV	Present Value
PMT	Mortgage Payment

Statistical Functions

COUNT	Number of items in a list
SUM	Sum of all items in a list
AVG	Average of all items in a list
MIN	Minimum of all items in a list
MAX	Maximum of all items in a list

SIMPLY POWERFUL.

Introducing Electric Desk™ from Alpha Software. It's the first software ever that works exactly like you do.

With Electric Desk you can have word processing, spreadsheet, data base and communications all going at the very same time, all in a single software program. So you can switch instantly from a letter to a memo to a budget over to a stock report and back again, in seconds. Or work on two tasks at once, and shoot information from one to another, all with a few keystrokes.

Stop in for a personal demonstration. It could be the best business decision you'll make all year.

- Demo disk available introducing main functions of program
- Menu driven
- On screen help – Context sensitive help to assist user. Help screens also contain user-guide page references
- Users can customize screen colors

Electric Desk—Integrated Productivity Software for the IBM PC, XT and PC*jr*.

Distributed in Australia exclusively by

Software Corporation of Australia Pty. Ltd.

449 Swanston Street Melbourne, Victoria 3000
Telephone: (03) 347 7011 (02) 328 7074

storage. Instead we can define an 'anonymous' function which is created only where it's needed, using that cryptic word LAMBDA. It's used so:

```
(MAPCAR LIST '(LAMBDA (NUM)
  (TIMES NUM NUM)) )
```

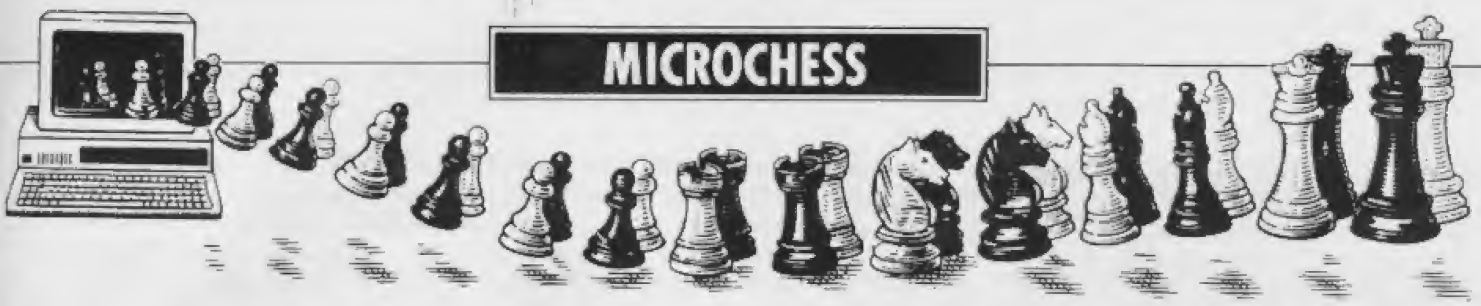
The LAMBDA expression defines a function identical to SQUARE (try reading DEFINE SQUARE instead of LAMBDA), but which has no name and only exists during the evaluation of the MAPCAR.

Some readers may be using versions of Lisp (muLisp, for example) which require the function LAMBDA to be used in ordinary definitions. To them I apologise. What's more, *all* versions of Lisp insert LAMBDA into the internal stored form of definitions (just as they expand into (QUOTE editor). I deliberately postponed examination of LAMBDA until this late stage because it's too confusing and alarming to introduce it at the same time as DEFINE. LAMBDA is the function which defines functions and controls the way arguments are passed, but most modern dialects disguise its presence from the user as it means a whole extra level of brackets and makes definitions much less readable.

You should now be convinced of the importance of list processing as a technique. It can model anything from human languages to the construction of DNA (ribosomes as biological Lisp machines?) Lisp is an elegant, at times beautiful, but sometimes exasperating implementation of list processing for computers. Languages like Logo and POP-11 provide a more conventional (and friendly) syntax, Prolog adds the power of automatic pattern matching, and in the future we might even see Basic with list processing extensions. But in learning Lisp you've started at the right place — the beginning. END

This is the final part of our six-part Teach Yourself Lisp series. Back issues can be obtained from our office at 77 Glenhuntly Road, Elwood, Victoria 3184.

'It says we should change our name to the Informal Party.'



Look back in dismay

The recently held World Microcomputer Chess Championship was full of surprises, as Tony Harrington found out.

Looking back with hindsight at the predictions I made about the likely outcome of the 4th World Microcomputer Chess Championship (WMCC), I find many reasons for dropping the prediction-making habit as quickly as possible (see November *APC*). This World Championship was full of surprises.

The first of these concerned those who weren't there. The Novag Super Constellation was many people's idea of a hot favourite prior to the event. It had beaten all kinds of international masters at blitz chess and had acquired a great reputation in the process. Surely Novag would want to cash in on its potential and claim a WMCC title. But no, instead of an entry form, Novag sent round a circular to everyone except the organisers a week or two before the tournament, stating why these kinds of events were not worth entering.

In golf that would be called playing the percentage shot: if you have a good reputation already, why risk blowing it? However, that wasn't one of Novag's reasons for not entering. It was worried about the absence of any reliable test to differentiate between a genuine 'commercial entry' and something running on equipment way out of reach of most people's pockets. That sounds a reasonable grumble, but it has more to do with marketing nerves than reality. I still think the Super Constellation might have won if it had been allowed a chance (another prediction, but habits are hard to break).

SciSys was a less surprising absence. Nothing had been said before the tournament about a real improvement in the SciSys Superstar program. The word from SciSys was that it was working on one but that it would not be ready in time for the event.

Even with these two manufacturers out of the running, the field was one of the largest ever with nineteen entries beginning and — even more remarkably — finishing the tournament (despite the occasional threat of a walk out, a normal occurrence at these events).

Far and away the most astonishing thing about the tournament, from my point of view, was the reappearance of Conchess, which had three entries. Ulf Rathsman, the programmer, had been quietly beavering away since Conchess's rather undistinguished initial public performance at a 1982 tournament, and had come up with a program capable of testing the best.

Then there was the Mephisto team, also with three entries. Mephisto had drawn some flak over the last year for releasing a Mephisto III which had the unfortunate habit of losing to the earlier Mephisto II. (New releases are supposed to be better than the old, rather than just different.) So it was nice to see that Hegener and Glazer, the supplier, appeared to have some improvements to offer.

Fidelity, as usual, had a strong array of entries, supplemented by a number of Spracklen programs running on business computers like the Compaq, the Macintosh and the Apple. Intelligent Software entered an experimental program and — good news for home computer owners — Richard Lang and Martin Bryant, two regular participants in what used to be the annual European Tournaments, also had entries.

Lang's Cyrus program, available in one form or another on both the Spectrum and the Dragon, was replaced for this event by a new generation program designed for the Sinclair QL. Sponsored by Psion, which will be marketing it in the UK, Lang's program (called Psion after the sponsor, undoubtedly a wise decision) ran, for the purposes of the tournament, on an 8MHz Sage computer. It will, he reckons, be slower by a factor of three on the QL, but even so, it looks like being one of the strongest home computer programs in the world. Lang won joint first prize in a four-way tie for first place. This earned him a large bottle of Lang's Whisky (though he assures us he is not related).

Bryant improved on his White Knight program for the BBC with a program called Colossus, which has done very well as a commercial program for the Commodore 64 (see December *APC*). For this event, he entered a souped-up version of Colossus, running on an Apple II.

Last, but not least, there was the solitary amateur entry, Geoff Bulmer's 'Chessnut', a plucky little program running on a Commodore 64 and guaranteed of the best amateur trophy even if it didn't win a game (it didn't).

The seven-round Swiss tournament was held in Glasgow (9 to 15 September). Sponsored by CGL Ltd and Langs Supreme Whisky, in association with Stakis Hotels PLC, my main concern is that unless the Scots feel like an early celebration, we might have to wait another hundred years for a micro tournament to be as well organised and presented.

From the opening ceremony to the grand buffet close, it was a wonderfully organised and run event.

Rounds began at 2pm each day and went through to a *theoretical* 10pm close. I say theoretical because the tournament director, Mike Valvo, a US International Master, made a practice of

Game No 1 Sargon Compaq versus Mephisto B

1	Nf3 d5	20	Nxd2 Qe2
2	g3 Nc6	21	Rfd1 Bh5
3	Bg2 e5	22	f3 Ne5
4	d3 Nf6	23	g4 Nxg4
5	0-0 Bf5	24	fxg4 Bxg4
6	Bd2 Bc5	25	Qa3 Rxd2
7	b4 Nxb4	26	Rxd2 Qxd2
8	Nxe5 Qd6	27	h3 Qd4+
9	Bc3 0-0	28	Kh1 Bd7
10	Nd2 Rf-e8	29	a5 Bc6
11	e4 dxe4	30	a6 b5
12	Nec4 Qa6	31	Rb1 Bxe4
13	Bxf6 Qxf6	32	Qb3 Bxg2+
14	dxe4 Bg6	33	Kh2 Bc6
15	Rb1 Qa6	34	Kg3 Re2
16	a3 Nc6	35	Qf3 Bxf3
17	a4 Bb4	36	Rf1 Qe5+
18	Ra1 Rad8	37	Kxf3 Qe4+
19	Qc1 Bxd2	38	Kg3 Rg2 mate 0-1

This was one of the better games from the tournament. The manner in which Mephisto forces the win is particularly impressive.

Game No 2 Intelligent Chess Software (ICS) versus Chessnut

1	d4 d5	9	f3 Bh5	17	Qc6 Rd1+
2	c4 Nc6	10	Qb3 b6	18	Kxd1 Kd8
3	Nc3 dxc4	11	Qa4+ Qd7	19	Nxc7 Bf7
4	d5 Ne5	12	Bb5 0-0-0	20	Kc2 Kc8
5	Nf3 f6	13	Qxa7 Qxb5	21	Na6+ Kd8
6	Nxe 5 fxe5	14	Nxb5 Nxd5	22	Rd1+ Bd5
7	e4 Nf6	15	Qa8+ Kd7	23	Rxd5 mate
8	Bxc4 Bg4	16	Qxd5+ Kc8	24	0-1

Although ICS didn't do well overall, it was quite up to exploiting a poor opening by Chessnut.

call things a draw Valvo was heard to say: 'Let's give it 10 more moves and see what happens . . .'

The chess played was definitely of a higher standard this year than ever before, but you would have been hard pressed to spot that from most of the games scores.

Computers, even good ones, play boring chess against each other; they allowing play to go on where necessary until the computers either bored their programmers to death or reached a result. If there was the smallest sign of theoretical interest left in the game, he was willing to pace the floor and let the machines fight it out. Even when the programmers themselves wanted to look much more impressive against chess players, when the game takes on more shape and sharpness.

But although it didn't lead to much in the way of spectacular middle game fireworks or witty sacrificial attacks, the increased strength of many of the participants showed up in the large number of end games that were reached (see Games section).

Another indication of the strength of the event is that Martin Bryant's Colossus—which I have always thought of as a very good program — could only scrape up one and a half points against the dedicated machines.

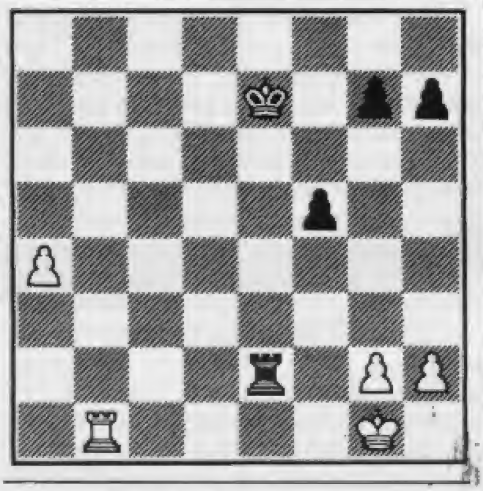
Caithness Glass bowls were presented to the four winners by Professor Monroe Newbarn, president of the ICCA. The actual title of commercial world champion, though, went to the Mephisto A, since it was the only machine among the winners which fulfilled the condition of being currently available in the shops.

The Fidelity Elegance ran at 6.1MHz on a 6502 processor, the Mephisto programs at 12MHz on a 68000 and Princhess (or Conchess) at 6.1MHz on a 6502 chip. Full tournament bulletins are available from Chess Suppliers (Scotland) Ltd, 15 Hope St, Glasgow G2, Scotland.

Games section

White: Fidelity Elite X. Black: Mephisto B. Notes by Grandmaster Dr John Nunn

(The 4th World Microcomputer Chess Championship was notable for the close finish and for the surprising number of interesting end games arising. The reason for this is probably that the struggle between the stronger programs created today is likely to remain finely balanced for a long time. The following fascinating ending was of some sporting interest since the Fidelity Elite X needed to win against Mephisto B to tie for first. We take up the story with the Elite, as White, about to make its 43rd move.)



43 Rb1-a1!

(Although material is level, White has all the chances because the passed a-pawn can be used to deflect Black's pieces from the defence of his kingside pawns. White correctly places his rook behind the pawn to support its advance.)

43 . . . Ke7-d6

(Black later decides to blockade the pawn with his rook in any case, so it would have been better to do this immediately by 43 . . . Re2-e6 44 a4-a5 Re6-a6.)

44 a4-a5 Kd6-c7
45 a5-a6 Re2-e8

(Black would have preferred to use his king to obstruct the pawn's advance by 45 . . . Kc7-b8 46 a6-a7+ Kb8-a8, so as to leave the rook actively placed, but White can play 45 . . . Kc7-b8 46 Ra1-b1+! followed by RB1-b7 attacking the kingside pawns.)

46 Ra1-b1?

(Giving Black unnecessary chances. 46 a6-a7 Re8-a8 47 Kg1-f2 Kc7-b7 48 Kf2-f3 Ra8xa7 49 Ra1xa7+ Kb7xa7 50 Kf3-f4 Ka7-b6 51 Kf4xf5 Kb6-c7 52 Kf5-e6 followed by Ke6-f7 wins the kingside pawns. We shall meet several lines in which the rooks are exchanged, when the result depends on whether White's king can penetrate to attack the g7 and h7 pawns before Black's king comes to the rescue. Here the result is as close as it could be, depending on a single move.)

46 . . . Re8-b8

(46 . . .g7-g6 47 Rb1-b7+ Kc7-c6 48 Rb7xh7 Re8-e1+ 49 Kg1-f2 Re1-a1 was no better because of the strong reply 50 Rh7-h6!.)

47 Rb1-e1?

(Missing 47 Rb1xb8 Kc7xb8 48 Kg1-f2 winning as before.)

47 . . . Kc7-d6
48 a6-a7 Rb8-a8

(White reverts to the correct plan. Black's rook is completely immobilised, so White has time to bring up his king.)

49 . . . g7-g6
50 h2-h3 Kd6-c7
51 g2-g4?

(This should have thrown away the win, which could have been forced by the familiar plan of 51 Kg1-f2 followed by a king advance.)

52 . . . f5xg4
52 h3xg4 Kc7-b7

(Now we can see the difference. Thanks to the pawn exchange Black can meet 53 Kg1-f2 by 53 . . . Ra8xa7 54 Ra1xa7+ Kb7xa7 55 Kf2-f3 h7-h5 exchanging White's last pawn and drawing.)

53 Ra1-b1+ Kb7-c6

(Black could also have taken the pawn, but he has not spoilt anything yet.)

54 Rb1-a1 Kc6-b6
55 Ra1-b1+ Kb7xa7
56 Kg1-f2

(White is in no danger of losing despite his minus pawn, since Black's king is too far away, but equally he should not win.)

56 . . . Ra8-f8+
57 Kf2-g3 Rf8-f7

(57 . . . h7-h5 was the simplest draw.)

Three teachers for Sinclair ZX Spectrum, BBC Commodore 64 now available in Melbourne

Arnold Wheaton, Sulis and Widgit

These three established educational software publishers have seen the light and have selected Micro-Allsoft to manufacture and distribute their excellent ranges of teaching software throughout Australia.

Programs available now, for classroom or home use, are designed for all student ages. Many come with varying degrees of difficulty.

There are even pre-school 'starters' for two-year-olds, and packages for adults.

These software packages are ideal for youngsters as the learning content is varied with lighthearted games to keep attention and interest.

Our educational programs cover a lot of subjects like . . .
• Alphabet • Spelling • Vocabulary • Reading
• Punctuation • Grammar • Shakespeare
• History • French • Time • Counting
• Angles • Logical Thinking • Spatial Reasoning
• nature studies • weather station
• tell the time analog-digital • animal-vegetable-mixed
• shape sorting

* Trade Enq welcome

Micro-Allsoft is the new name in educational software. It will pay you to phone us or mail the coupon below for more information.

micro-allsoft

P.O. Box 6205, St Kilda Rd, Central 3004
Telephone 10am-5pm: 240 0156
Hello, Micro-Allsoft. Please send me details on Sinclair ZX Spectrum, Commodore 64 or BBC educational software.

Name _____

Address _____

_____ postcode _____ 'phone _____

APC

Top Fifteen!

TOP-OF-THE-CHART

COMPUTER SOFTWARE

HIT PARADE

UK. DEC 84			UK. DEC 84
1	UNDERWURLDE	SPECTRUM	$24.95
2	TIR NA NOG	SPECTRUM	$24.95
3	EUREKA	CBM 64	$39.95
4	EUREKA	SPECTRUM	$39.95
5	FORT APOCALYPSE	CBM 64	$24.95
6	DALEY THOMPSONS DECATHLON	SPECTRUM	$20.50
7	RAID OVER MOSCOW	SPECTRUM	$24.95
8	KNIGHT LORE	SPECTRUM	$24.95
9	PSI-WARRIOR	CBM 64	$24.95
10	BACKPACKERS GUIDE	SPECTRUM	$22.50
11	TRAVELS WITH TRASHMAN	SPECTRUM	$19.50
12	BRUCE LEE	CBM 64	24.95
13	JASPER	SPECTRUM	$22.50
14	EDDIE KIDD JUMP CHALLENGE	SPECTRUM	$18.50
15	COMBAT LYNX	SPECTRUM	$22.50

TOP OF THE CHART

COMPUTER SOFTWARE

HIT PARADE

P.O. Box 6205
St Kilda Rd Central 3004
Melbourne Vic.

MAIL ORDER — FREE POSTAGE!

○ BBC ☐ CBM 64 ☐ SPECTRUM

PLEASE SEND ME

☐ ☐ ☐

MASTER CARD ☐☐☐ ☐☐ ☐☐☐ ☐☐☐☐☐☐

BANKCARD NO.

NAME

ADDRESS

P CODE

PAYMENT ENCLOSED
☐ CHEQUE
☐ MONEY ORDER
☐ CREDIT CARD NO

MICROCHESS

58	g4-g5	Rf7-f5
59	Kg3-g4	Ka7-a6
60	Rb1-d1	Rf5-f7
61	Rd1-b1	Rf7-b7??

(Mephisto's blunder allows the Elite X to take joint first place. Black only needed to mark time by 61 . . . Ka6-a7 to draw, since White cannot undertake anything positive.)

62	Rb1xb7!	Ka6xb7

(White's king is able to win both Black pawns and reach a won position with king and pawn vs king.)

63	Kg4-f4	Kb7-c6
64	Kf4-e5	Kc6-c5
65	Ke5-f6	Kc5-d4

(Or 65 . . . Kc5-d6 66 Kf6-g7 Kd6-e7 67 Kg7xh7 Ke7-f7 68 Kh7-h6 Kf7-f8 69 Kh6xg6 Kf8-g8 70 Kg6-f6 Kg8-f8 71 g5-g6 Kf8-g8 72 g6-g7 Kg8-h7 73 Kf6-f7 and the pawn promotes to a queen.)

66	Kf6-g7	Kd4-e4
67	Kg7xh7	Ke4-f5
68	Kh7-h6	Kf5-e5

(Black has no choice but to abandon his last pawn to its fate.)

69	Kh6xg6	Ke5-e6
70	Kg6-h7	Ke6-d5
71	g5-g6	Kd5-e6
72	g6-g7	

(and Black resigned.)

NEW YEAR OFFERS!!

OFFER #1:

BI-XT-88 16 Bit Computer

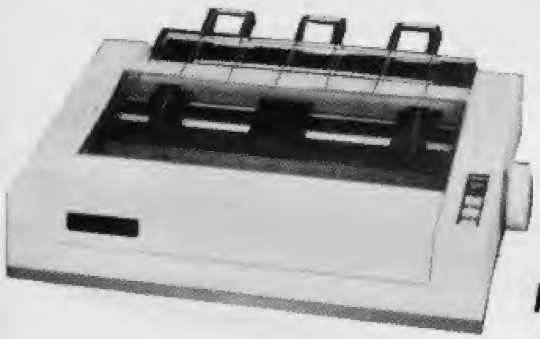
The ULTIMATE Personal Computer that gives you IBM™ PC/XT compatibility at a fraction of the cost.

PC 88 COMPLETE SYSTEM **$3500.00***

(a) 256K RAM memory with twin floppy DSDD disk drives. 16 bit 8088 CPU with interrupt control (8259) and direct access controller (8237). Colour graphic card multifunction card. Disk drive card and mainboard & keyboard 100 watt fan.

(b) TAXAN Colour vision III monitor — RGB.

*(c) PLUS — **FREE** — 120 CPS dot matrix printer 'PX-120'*



COURIER SERVICE AVAILABLE
Free delivery in Sydney Metropolitan area.
* 6 months warranty for parts and labour.

OFFER #2: *One Diskette box containing 10 x 5¼" DDSS diskettes. PLUS — One 50 Floppy diskette 5¼" Storage Box (plastic casing with diskette free)* **$35.00*** *Certified and error free.*

BI COMPUTER PTY. LTD. (Incorp. in N.S.W.)
P.O. Box 896, Potts Point, 2011.
Suite 23 (2nd flr.), Minton House,
2A Bayswater Rd., Kings Cross, N.S.W. 2011.
Telephone: (02) 356-2388

* Postage & handling extra
* WHILE STOCKS LAST!

Name: ..... OFFER 1: qty ☐
Company: ..... OFFER 2: qty ☐
Address: .....
..... Postcode: .....
Telephone ( ) .....

I wish to pay by Bank Cheque ..... Bankcard .....
Card No ..... Expiry Date .....
Signature .....
Post & handling ☐ Courier ☐

OPTION: Computer Training Services available, Incl. Word Processing, Lotus 123 — CALL NOW FOR DETAILS.

TRADE ENQUIRY WELCOME

BANKS' STATEMENT

The biggest slice

Would software manufacturers have more financial success if they tailored their products towards a well-defined market? Martin Banks crossed a few palms to find out.

A few weeks ago, a friend of mine in the computer industry came up with a fascinating but inconsequential fact. In 1983, IBM made $2.50 profit for every second of my 80-year-old uncle's life. At first I thought that this was the most irrelevant piece of information I had ever heard (unless I was IBM's bank manager, of course), but I played with some numbers and found that in the first quarter's trading last year, the jolly blue giant had made around $1 profit for every second he has been alive.

This is all quite stunning, but so what? Then I thought: 'Billions of dollars' just sounds like a hell of a lot of money when you say it out loud. Consider it in terms of an equivalent, such as seconds of life, and you realise just *how* much of a hell of a lot it really is.

If, therefore, IBM can make that much money out of the computer business, why are so many other companies going under?

There are, of course, significant reasons why IBM is such a success. It started by being in the right place at the right time when the computer industry first took off. It pursued its sales and marketing objectives with a zeal that still borders on religious mania. It became *the* name in computers: for many people computing means IBM, and that includes other computer manufacturers.

But why has it succeeded while others have failed? One possible reason for such success was recently brought to my attention. I visited a software company that had done well out of addressing a vertical slice of the software market place, and was due to launch its latest product. Its target was the legal profession, a business well-known — in folklore if not always in fact — to be one of the most remunerative ways of earning a living.

The package was introduced and explained, and the price was mentioned in passing; at which point I felt the urge to seek a little clarification on the indelicate point of the price tag. What, I wondered, did one get for the $3,000-plus that had been mentioned? If it was an all-up price, including the hardware, then it looked like a reasonable deal.

'Ah, no,' I was informed. 'That's just the price of the software package.'

Just the price of the software package? Good God. There are companies around the country who could — probably are — writing programs as complex for under $1,000.

'You may not become a millionaire or reach IBM's enviable financial status but there's good money to be had making the icing for The Big Blue One's extremely fulsome cake.'

It was then that the thought struck me. I've seen several software product catalogues from distributors and individual product announcements from software companies that reveal a great divide in the software business. Place your company in a nicely defined vertical market and you can charge what you like for the product. If the punters want it, they'll beat a path to your door, no matter what the price.

If, however, your product is of a more general nature with potential applicability across a wide range of user sectors, then the price must be low, competitive and aggressive. The related logic is quite straightforward: general-purpose applications packages will theoretically be sellable to a wide range of customers across a wide range of user sectors.

There is, therefore, the potential for high volume sales which justify an aggressive price. Such a price will also be needed to generate sales in the first place, because other software companies will be fighting for the same general-purpose data processing markets. They will all be selling word processors, database managers, spreadsheets *et al.* What will primarily distinguish the various packages will be price, unless the features of one are so stupendous as to be unbelievable, or so appalling as to be laughable.

Even the prices will be broadly similar, with each new entrant to the market attempting to provide more facilities than the current leading product in any sector at a lower price.

Yet, as has been found many times before (the latest being the home computer hardware market), there's only ever room for two or three successful products in any category and, once these market leaders are, by whatever process, defined, the other contenders are doomed to either struggle or suffer an ignominious failure. That is unless they can offer the user something different, or better.

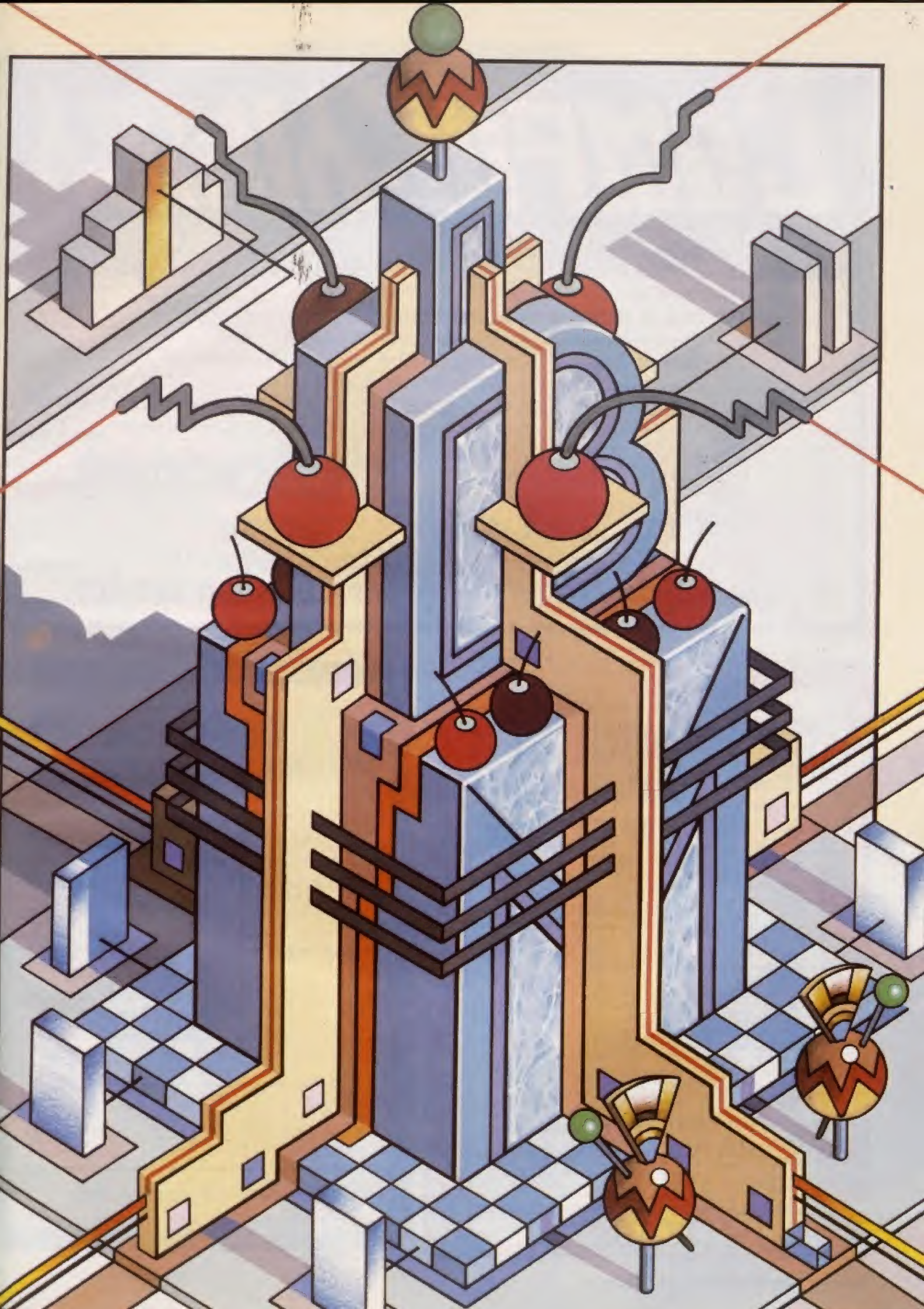
Then they find that they can even charge for it. They may not sell as many units as the market leaders, but their profitability will often be greater in percentage terms. Such companies are now making the transition towards addressing vertical markets, where they may well find that the pressures are slightly more bearable and the problems slightly less.

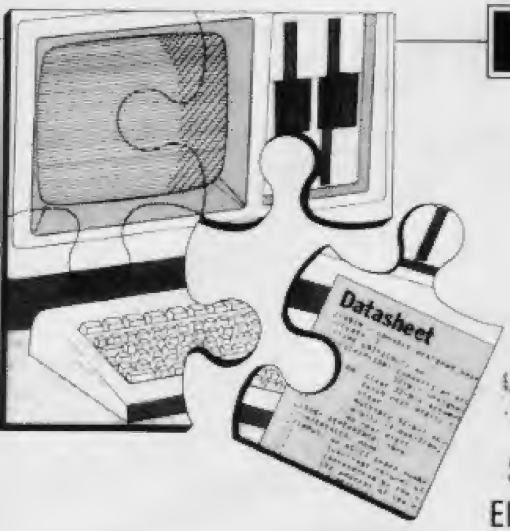
As can be seen from the catalogue of software distributors, pick the right vertical market and you can name your own price. Something for the legal profession perhaps, or the building trade — anywhere that's used to shelling out money in large dollops for its product purchasers. These are the markets to go for.

You could spend less time and effort developing a package in those fields than in developing a word processor. You could come up with a package that had seventeen times more the power of WordStar, could run immediately on any machine and cost just $50 and it still wouldn't sell. With a well-defined vertical market product you're almost guaranteed business. I've heard of customers buying such products, often several copies, just for evaluation purposes, to 'find out what it's capable of.'

At vertical market prices, that can be good business; in the general purpose applications business, it can mean bankruptcy.

You may not become a millionaire or reach IBM's enviable financial status but there's good money to be had making the icing for The Big Blue One's extremely fulsome cake.





SUBSET

David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to Sub Set, APC, 77 Glenhuntly Road, Elwood, Victoria 3184.

68000 Random

SubSet is making a big leap from 8-bit to 32-bit processing with RNDW (Datasheet 1) from Matthew Rhodes. RNDW uses the algorithm R(i+1) = (1509*R(i)+41) mod 2**16, thought to produce good 16-bit pseudo-random numbers. Matthew also submitted a 32-bit generator using R(i+1) = 69069*R(i) + 41) mod2**32 which will be given in the February issue.

Matthew was unable to test the routines and as I don't own a Macintosh, I would be glad to hear if RNDW does work satisfactorily.

Two listings are provided in the RNDW Datasheet. These show the code that ought to be generated by an assembler for a SEED within or outside the range of 'base page' memory. They also demonstrate alternative methods of adding immediate data to a data register.

DATASHEET 1

```
;*************************************************************
;* RNDW      16-bit pseudo-random number generator.
;*************************************************************
;JOB        To generate a 16-bit random number from the
;           series: Ri+1 = (Ri * 1509 + 41) mod 2**16.
;ACTION     Read previous random number from store.
;           Multiply by 1509 and add 41.
;           Write low order word of product to number store.
;-------------------------------------------------------------
;CPU        MC68000 series.
;HARDWARE   Two bytes of RAM for random variable (must be
;           located between $FF8000 to $007FFF inclusive for
;           "absolute short" address version, RNDWAS).
;SOFTWARE   None.
;-------------------------------------------------------------
;INPUT      16-bit seed or previous random number must be in
;           RAM variable SEEDS or SEEDL.
;OUTPUT     New random number in SEEDS or SEEDL,
;           D0 low word = new random number.
;           D0 high word holds multiplication high result.
;           Negative (N) and Zero (Z) flags show the status.
;           Overflow (V) and Carry (C) flags are cleared.
;ERRORS     Re-entrancy could cause numbers in the sequence
;           to be missed, affecting the randomness.
;REG USE    D0 CCR
;STACK USE  None.
;RAM USE    None.
;LENGTH     :8 (RNDWAS), 22 (RNDWAL).
;CYCLES     68000: 108 (RNDWAS), 116 (RNDWAL).
;           68008: 160 (RNDWAS), 180 (RNDWAL).
;           68010: Max. 92 (RNDWAS), Max. 100 (RNDWAL).
;-------------------------------------------------------------
;CLASS 2    -discreet  *interruptable  *provable
;           -reentrant  *relocatable  -robust
;*************************************************************
;
;...Code generated by assembler when "SEED" is located at
;...an address between $FF8000 and $007FFF (inclusive).
```

```
SEEDS   EQU     $a1a0     ;Address of 2-byte random number.
;
RNDWAS  MOVE.W  SEEDS,D0  ;Get old number or seed into     3038
                          ;Data register 0, low word.      a1a0
        MULU    #1509,D0  ;Multiply it by 509 with         C0FC
                          ;product in all D0.              05E5
        ADD.W   #41,D0    ;Add 41 to low word only,        D07C
                          ;this is modulo 2**16.           0029
        MOVE.W  D0,SEEDS  ;Store new number (in low word   31C0
                          ;D0) back to variable.           a1a0
        RTS               ;Exit, number formed.            4E75
;
;...Code generated by assembler when "SEED" is located at
;...an address between $008000 and $FF7FFF (inclusive).
;...("ADDI" is an alternative to "ADD" for adding immediate
;...data into a Data register.)
SEEDL   EQU     $a2a1a0   ;Address of 2-byte random number.
;
RNDWAL  MOVE.W  SEEDL,D0  ;Get old random number or        3039
                          ;seed into lowest word of        00a2
                          ;Data register 0 (D0\3).         a1a0
        MULU    #1509,D0  ;16-bit by 16-bit multiply;      C0FC
                          ;D0\F = D0\3 * $05E5.            05E5
        ADDI.W  #41,D0    ;16-bit addition;                0640
                          ;D0\3 = D0\3 + $0029.            0029
        MOVE.W  D0,SEEDL  ;Copy new random number from     33C0
                          ;D0\3 to random variable,        00a2
                          ;affecting N, Z, V and C flags.  a1a0
        RTS               ;Exit, number in SEEDL & D0\3.   4E75
;*************************************************************
```

6502 n-base conversion

XBIN by Dennis May converts an unsigned (positive or absolute) number of any base from 2 to 36 into a 32-bit binary value.

The input number is a string of ASCII digits and upper-case letters ending with a $0D (carriage return) terminator. The unsigned binary result is output in four consecutive page zero bytes.

DATASHEET 2

```
;*************************************************************
;* XBIN      Unsigned ASCII base 2-36 to 32-bit conversion.
;*************************************************************
;JOB        To convert an unsigned number, of any base 2 to
;           36, held in memory as ASCII digits and upper
;           case letters to an 32-bit binary number held in
;           registers or base-page "pseudo-registers".
;ACTION     Clear result.
;           Get first character.
;           ON overflow: [ Set overflow flag & exit. ]
;           WHILE character NOT terminator:
;           [ Convert character to binary coded digit.
;             Result = result * base + digit.
;             Index and get next character. ]
;           Set conversion completed flag.
;-------------------------------------------------------------
```

WHAT TO LOOK FOR . . .
THE NEW-LOOK PCG

STARTS JANUARY at the ridiculously low price of $1.95

DO IT... Free programs in Australia's largest listing section

SOLVE IT... Hints, tips and better ways to program

PLAY IT... Adventure or arcade, action or application

GET IT... Only in the new action-packed PCG

PLUS... Circuits to build and connect to your micro!

```
;CPU        6502
;HARDWARE   Memory containing ASCII number string.
;SOFTWARE   None.
;-------------------------------------------------------------
;INPUT      M4,5 addresses 1st byte of ASCII string which
;           must terminate with $0D (carriage return).
;           M6 contains the number base.
;OUTPUT     Registers changed. M7 to MC changed.
;           M4 to M6 not changed.
;           C = 0: conversion completed.
;             32-bit result in M0 to M3 (M3 is high order).
;           C = 1: overflow during process.
;             M0 to M3 is indeterminate.
;ERRORS     No test is made for non-upper-case alphanumeric
;           characters in ASCII string.
;           No test is made for digits greater than base.
;REG USE    P A X Y
;STACK USE  2
;RAM USE    M0 to MC
;LENGTH     106
;CYCLES     Not given.
;-------------------------------------------------------------
;CLASS 2    -discreet  #interruptable  #reusable
;-###--     #reentrant  -relocatable  -robust
;*************************************************************
;
ASCN   =   M4          ;Stored address of ASCII string.
BASE   =   M6          ;Stored ASCII number base (2 to 36).
BTMP   =   M8          ;Storage for working BASE.
RSLT   =   M0          ;4-byte result location (low byte).
RTMP   =   M7          ;Storage for working RSLT (low byte).
INDX   =   MC          ;Storage for ASCII string pointer.
;
XBIN   LDY  #0         ;Clear for RSLT clear.          A0 00
       LDX  #4         ;Index for RSLT 4 bytes.        A2 04
;
XBIN1  DEX             ;Index RSLT next byte           CA
       STY  RSLT,X     ;and clear it, repeat           94 M0
       BNE  XBIN1      ;until RSLT clear. X = 0.       D0 FB
       STX  INDX       ;Initialise ASCII index to 0.   86 MC
;
XBIN2  LDY  INDX       ;Index current ASCII byte       A4 MC
       LDA  (ASCN),Y   ;and pick it up.                B1 M4
       CMP  #$0D       ;If ASCII "carriage return"     C9 0D
       BEQ  END        ;terminator then completed.     F0 52
;
       SEC             ;Strip ASCII digits high        38
       SBC  #$30       ;nibble and test for if         E9 30
       CMP  #$0A       ;greater than digit 9,          C9 0A
       BCC  ASCY       ;adjusting for gap between      90 02
       SBC  #7         ;"9" and "A" if it is.          E9 07
ASCY   PHA             ;Save new digit.                48
       LDA  #0         ;Clear for RTMP clear.          A9 00
       LDX  #4         ;Index for RTMP 4 bytes.        A2 04
;
XBIN3  DEX             ;Index RTMP next byte           CA
       STA  RTMP,X     ;and clear it, repeat           95 M7
       BNE  XBIN3      ;until RTMP clear.              D0 FB
;
       LDA  BASE       ;Move base to temp byte for     A5 M6
       STA  BTMP       ;use as multiplier.             85 M8
       LDY  #8         ;Count for 8-bit multiplier.    A0 08
;
XBIN4  ASL  BTMP       ;Shift next multiplier bit      06 M8
       PHP             ;into C and save it.            08
       ASL  RTMP       ;Shift left partial product     06 M7
       ROL  RTMP+1     ;for possible addition at       26 M8
       ROL  RTMP+2     ;next bit place.                26 M9
       ROL  RTMP+3     ;                               26 MA
       BCS  OVFW1      ;Skip out if product too big.   B0 2E
       PLP             ;Get multiplier bit to C and    28
       BCC  XBIN6      ;skip if 0, no add this place.  90 0E
       LDX  #-4        ;Else index from low bytes.     A2 FC
       CLC             ;Clear for low bytes add.       18
;
XBIN5  LDA  RSLT+4,X   ;Add multiplicand byte to       B5 M4
       ADC  RTMP+4,X   ;partial product.               75 M8
       STA  RTMP+4,X   ;                               95 M8
       INX             ;Index next and repeat for      E8
       BNE  XBIN5      ;all four bytes.                D0 F7
       BCS  OVFW2      ;Out if product too big.        B0 1E
;
XBIN6  DEY             ;Repeat for all 8 bits of       88
       BNE  XBIN4      ;multiplier (base).             D0 DF
;
       CLC             ;Clear for add.                 18
       PLA             ;Get new digit and add to       68
       ADC  RTMP       ;product low byte, result to    65 M7
       STA  RSLT       ;partial conversion result.     85 M0
       LDX  #-3        ;Index from byte 2.             A2 FD
;
XBIN7  LDA  RTMP+4,X   ;Move other three product       B5 M8
       ADC  #0         ;bytes to conversion result     69 00
       STA  RSLT+4,X   ;adding in any carry from       95 M4
       INX             ;digit add in to low byte and   E8
       BNE  XBIN7      ;subsequent carries.            D0 F7
       BCS  OVFW3      ;Out if result too big.         B0 09
;
       INC  INDX       ;Index next ASCII byte and      E6 MC
       JMP  XBIN2      ;continue conversion.           4C lo hi
;
END    CLC             ;Flag conversion complete       18
       RTS             ;(C = 0) and exit.              60
;
OVFW1  PLA             ;Lose multiplier bit.           68
OVFW2  PLA             ;Lose digit.                    68
OVFW3  RTS             ;Exit (C = 1) on overflow.      60
;*************************************************************
```

68000 notation

The symbolic 'lohi' and 'hilo' used for 16-bit absolute addresses in Z80, 6502 and 6809 datasheet listings are inadequate for the 68000 with its 24-bit addresses. Instead, 'a2a1a0' signify the 3-byte addresses with 'a0' as the low order byte. Note that the 68000 requires the unused 'a3' to be in the code.

68000 Data and Address registers, Stack Pointers and Program Counters are all four bytes long. Much processing, particularly that dealing with ASCII characters, will use various combinations of individual bytes within registers and description of what is happening could be very complex.

For descriptive purposes, the position of the bytes within any register can be coded as a sequence of four bits with set bits indicating which register-bytes are currently being referred to. The code can be written as a single hexadecimal digit after the register name. This notation has been used in the comments to RNDWAL where the lowest two bytes of data register 0 are referred to as D0\3.

Here are two other examples of how the notation works: (1) the processor addresses program instructions using PC\7 (lowest three bytes of the Program Counter); (2) 'SWAP D4' can be described as D4\C exchanged with D4\3, but if we are using only the lowest byte of each word then it could be commented as 'exchange D4\4 with D4\1'.

Random bits VIA the 6522

RND16B (Datasheet 3) from T Browning is a 6502 equivalent of an idea put to me some time ago that a 7-bit random value could be read from the Z80 Refresh register, but with extra processing. It uses the two 16-bit counters of the 6522 VIA to compute 16 'random' bits.

Registers which increment or decrement in sychronisation with the system clock cannot be relied upon to give random values if read inside a loop. However, RND16B is a very fast method of getting a 'non-calculated' value.

DATASHEET 3

```
;*************************************************************
;* RND16B   Compute 16 random bits.
;*************************************************************
```

```
;JOB         To compute 16 random bits using a hardware timer
;            device with two independent 16-bit counters.
;ACTION      Set counters to decrement continuously without
;            interrupt.
;            Read contents of timer 2 into registers.
;            Exclusive-or hi-byte with lo-byte of timer 1.
;            Exclusive-or lo-byte with hi-byte of timer 1.
;            Write contents of registers to timer 2.
;-------------------------------------------------------------
;CPU         6502
;HARDWARE    6522 Versatile Interface Adapter (VIA).
;SOFTWARE    None.
;-------------------------------------------------------------
;INPUT       None.
;OUTPUT      A,Y contains an unknown (random) number.
;            Sign and Zero flags show status of byte in A.
;            VIA counters are free-running.
;            VIA port input latches are disabled.
;ERRORS      The randomness of the result depends entirely on
;            the regularity with which RND16B is called.
;REG USE     A Y P
;STACK USE   None.
;RAM USE     None.
;LENGTH      25
;CYCLES      38
;-------------------------------------------------------------
;CLASS 2     -discreet  +interruptable  +proasable
;-****-      +reentrant  +relocatable  -robust
;*************************************************************
;
RND16B LDA  #0      ;Clear VIA ACR putting timers     A9 00
       STA  ACR     ;in one-shot mode.                8D lo hi
       LDA  T2C-L   ;Exclusive-or lo-bytes with       AD lo hi
       EOR  T1C-L   ;hi-bytes of other counter        4D lo hi
       TAY          ;with Y as low byte result        A8
       LDA  T2C-H   ;and A as high byte result.       AD lo hi
       EOR  T1C-L   ;                                 4D lo hi
       STY  T2C-L   ;Write result into counter of     8C lo hi
       STA  T2C-H   ;timer 2, letting it decrement.   8D lo hi
       RTS          ;Exit, random bits in AY.         60
;*************************************************************
```

68000 challenge

The 68000 has both signed and unsigned 32-bit by 16-bit division with 16-bit quotient and 16-bit remainder. Division by zero and overflow are 'trapped' and the machine goes into Supervisor mode for 'exception processing'.

Worst-case division of a 32-bit number can give either a 32-bit quotient or a 32-bit remainder — the DIVS and DIVU instructions are possibly only worth using for 16-bit division.

Who will be first to subm a Class 132-bit division routine that cannot be 'trapped'?

PROPLUS

PC-1600/XT-1600

FEATURES:

- IBM PERSONAL COMPUTER COMPATABILITY
- RUNS LOTUS 1-2-3, WORDSTAR, dBASE 2 ETC.
- 256K-RAM STANDARD
- DUAL 360K-BYTE DRIVES STANDARD
- SERIAL PORT STANDARD
- PARALLEL PORT STANDARD
- COLOR/GRAPHICS I/F STANDARD
- BATTERY BACKED CLOCK/CALENDAR
- 20MHZ HIGH RESOLUTION MONITOR STANDARD
- 10M-BYTE HARD DISK (OPTIONAL)

WE PROVIDE YOU WITH ALL THE ADVANTAGES OF THE WELL ESTABLISHED IBM PERSONAL COMPUTERS AT AN AFFORDABLE PRICE. WE ALSO BOAST AN EXTENSIVE IN-HOUSE SERVICE CENTRE PROVIDING UNPARALLELED SERVICE SUPPORT.

THIS MONTH'S SPECIALS:
LOTUS 1-2-3 $595, LOCKING DISK HOLDER $29.95

SPECIAL OFFER CONTINUED

Present this advertisement and receive a huge discount of $700 off the normal price of $3500 (incl. tax). Once again, this offer is limited to the first 20 purchases made during January '85.

DEALER & CORPORATE ENQUIRIES WELCOME!

EASTERN MICRO ELECTRONICS

bankcard welcome here

92-94 BANK STREET, (Cnr of Bank Street and Kingsway)
SOUTH MELBOURNE, VICTORIA 3205. Phone: (03) 699 3088 Telex: AA38432 ATT EME

EME MODEL III

FEATURES:

- 6502 & Z80 DUAL PROCESSORS
- 64K-RAM
- UPPER & LOWER CASE
- EXTENDABLE KEYBOARD
- PROGRAMMABLE 10 FUNCTION KEYS
- 188 FUNCTION KEYS
- BUILT-IN COOLING FAN
- SINGLE OR DUAL SLIMLINE DRIVES INTERNALLY INSTALLED (OPTIONAL) ($299 EACH)

HI RESOLUTION (20MHZ) MONITOR WITH SWIVEL BASE

$199
Incl. Tax

$799
Tax incl.

SAVINGS

Bring along this ad and receive a $100 discount during December '84

MAILWARE SOFTWARE AND HARDWARE DISCOUNT WAREHOUSE

"Our prices speak for themselves ..."

SUPER SPECIALS FOR THIS MONTH ONLY:

Apple: PFS Write/File/Report/Graph - $175.00 this month only $129.00
IBM: Framework from Ashton-Tate - $795.00 this month only $569.00
Macintosh: Main Street Filer - $299.00 this month only $219.00
Commodore: Wordpro 3 - (disk) - $160.00 this month only $129.00

Software (sales tax included)	R.R.P.	Our Price
IBM		
Lotus 123 IBM/DEC/Wang	745.00	565.00
Symphony	995.00	785.00
Open Access	940.00	765.00
Attache	call	call
dBase III	795.00	625.00
Spellbinder	795.00	635.00
dBase II w/lessons	540.00	451.00
Wordcraft	call	call
Friday	360.00	253.00
Harvard Project Manager	649.00	486.00
Carpe acc. package	1200.00	999.00
Sybiz accounting	call	call
Concurrent CP/M 86	call	call
Concurrent PC DOS	call	call
Multimate	595.00	380.00
Rbase	630.00	520.00
Microsoft Word + Mouse	685.00	577.00
Wordstar Propak	795.00	595.00
Vision paks	call	call
Sargon III	74.95	69.96
Crosstalk	299.00	155.00
Corporate MBA	1200.00	999.00
Flight Simulator	87.95	67.95
Smart Key	79.95	65.95
Turbo Pascal	135.00	77.95
Perfect software	call	call
SuperCalc 3	445.00	359.00
Multiplan	395.00	315.00
Microsoft Word	499.00	395.00
Zork I/II/III	59.95	47.95
Access Manager	450.00	395.00
Software not listed	call	call

Hardware (plus sales tax)		
IBM		
Plug in modem (approved)	call	call
64K upgrade chips	110.00	89.95
Microsoft Mouse	259.00	215.00
Quadboards fr	550.00	call
Persyst boards fr	375.00	call
AST boards	call	call
Hercules	660.00	550.00
Microfazer 64K ser	490.00	406.00
Hard disks 5mb — 32mb	call	call
Hardware not listed	call	call

Macintosh		
Mac Multiplan	315.00	247.00
Mac File	315.00	247.00
Mac Zork I/II/III	89.95	79.95
Mac Manager	79.95	63.95
Mac PFS File + Report	320.00	265.00
Mac Hard Disk	call	call
Mac Floppy disks (10)	96.00	65.20
Mac more Mac bargains	call	call
Apple		
dBase II	540.00	395.00
Friday	360.00	253.00
Zardax	324.00	248.00
Sandy's W/P	225.00	189.00
Bank Street Writer	99.95	82.95
Championship Lode Runner	49.95	39.95
Microsoft Basic Compiler	659.00	510.00
Wordstar - CP/M - 64KB	595.00	485.00
Interstar - CP/M - 64KB	666.00	535.00
Flashcalc II/IIE/IIC	165.00	135.00
Turbo Pascal	135.00	78.95
Visifile	428.00	285.00*
Choplifter	49.95	37.95
Wizardry II/IIE/IIC	79.95	64.95
Beyond Castle Wolf	54.95	46.95
Educational software	from	22.50
PFS School Record	195.00	169.00
Hard Disks	call	call
S.A.M. voice synth	120.00	69.95*
Vision 80 128KB	499.00	275.00*
Vision 80 256KB	699.00	395.00*
Auto Ice printer card	130.00	82.50
Auto Ice smart modem	call	call
10 mb Hard Disk	call	call
Commodore		
Bank Street Writer	79.95	69.95
Multiplan	149.00	119.00
Flight Simulator	79.95	69.95
Zaxxon	59.95	49.95
Lode Runner	39.95	34.95
Atari		
for Atari software	call	

Sinclair		
for Sinclair products	call	
CP/M software		
Interstar	666.00	535.00
Nevada languages	59.95	49.95
Suspended (DEC)	69.95	59.95
more CP/M 80 & 86 s/ware	call	call
Hardware		
Kaypro computers with dBII, DataStar, WordStar, more		call in for
Fox — runs IBM software with free Lotus 123 256KB, more		the best prices
Columbia MS DOS, CP/M with Perfect S/ware, hard disk		in town
Apricoat 4th generation super micro thats easy to use		
Disks		
Verbatim SSDD (10)	49.95	38.95
Verbatim DSDD (10)	80.00	47.95
Memorex SSDD (10)	49.95	37.95
Memorex DSDD (10)	80.00	45.95
Microfloppies 3 5	96.00	65.20
SSDD 5 1/4 (10)	45.00	35.95
other disks	call	call
Modems and Acoustic Couplers		
Cicada 300	250.00	189.00
Sendata 700 a/c	286.00	call
Videotex compt modem	call	call
for more modem bargains	call	call
Printers (sales tax incl.)		
Silver Reed 770 daisy wh	1770.00	1399.00
Silver Reed 500 daisy wh	787.00	599.00
Star Gemini 10X	539.00	419.00
Star Gemini 15X	795.00	649.00
Epson RX80F/T	649.00	565.00
Epson FX100	1333.00	1199.00
Epson LQ1500	2130.00	1839.00
more printer bargains	call	

Prices current at the time of printing, subject to change without notice.

For all products not listed, Call (02) 212 1622

Call for sales tax exempted prices. Call for specials: (02) 212 1622

Order by phone, or send cheque or money order to:

MAILWARE, P.O. BOX K109, HAYMARKET, NSW, 2000. TLX: 70208

All products are latest release versions. All products carry full manufacturers warranty and support.

Software from Arcom Pacific, Imagineering, Microsoft, Sourceware, Digital Research, Sorcim, MicroPro, Ashton-Tate and others.

Should there be any price reductions since the printing of this magazine, we will pass these onto our customers. Please do not hestitate to call us and confirm the latest prices, and we will do our best to better any genuine price quoted by our competitors.

SOFTWARE AND HARDWARE DISCOUNT WAREHOUSE MAILWARE

PROGRAMS

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer.

Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

All programs should be fully debugged and your own original, unpublished work.

We prefer to receive programs which adhere to the following criteria:

1 Maximum 80-column width; and

2 Emphasised typeface.

Please keep a copy of everything.

Programs are paid for at the rate of $20 per page of published listing.

Send your contributions to APC Programs, 77 Glenhuntly Road, Elwood, Victoria 3184.

Dragon/Tandy Color owners who have created an adventure party with 'Brimstone Part One' published last month can now explore their first dungeon with 'Brimstone Part Two'. This advanced Dungeons and Dragons-type program, although lacking the polished finish of commercial programs, has great puzzle quality and game depth. Next month there'll be another scenario — 'The Tavern' — and details on how to create your own dungeons.

'Defkeys' for the Commodore 64 allows the function keys to be defined to any string, and there's 'Golf' for the Spectrum. 'Rudiments of Raster Interrupts' for the '64, a useful 'sort at' input for the TRS-80 (which is general enough to be easily converted for other machines) and more in the first 'Programs' listing for 1985.


Games


Scientific/mathematic


Business


Toolkit/utilities


Educational/Computer Aided Learning

Brimstone Part Two

by Paul Gallagher

To play 'Brimstone Part Two' you'll need some adventure characters created with 'Brimstone Part One', which was published in last month's *APC*. Having equipped yourself with a character or an adventure party of up to four characters, you can now begin your first scenario — The Dungeon.

The rules should be familiar to Advanced Dungeons and Dragons players as the game follows AD&D's format; non AD&D players needn't worry as full instructions are included and the program uses simple menu selections. As in the role-playing games, you have to make any maps you feel are necessary.

The rooms are contained in a data block, thus permitting new dungeons to be readily created by other dungeon 'masters'. The dungeon in this program has 75 rooms and corridors on seven floor levels. There's an option to save the game at any room position providing you are not involved in combat, but if you wish to progress to part three, The Tavern, you must save the game at the exit (room one).

The program runs in over 30k, so before loading, the following command must be entered:

POKE 25,6:NEW

```
10 'BRIMSTONE PART II copyright P.Gallagher 1984
20 CLEAR700:DIM TF$(6),MS$(80):CLS:PRINT"NEW GAME OR CURRENT ADVENTURE.":GOSUB40
:IFK$="C"THENGOSUB318ELSEGOSUB3250
30 L=1:P=75:O=96:P=107:N=1288:FORX=1TOXX:FORY=1TO8:SV$(X,Y)=SV$(X,Y):NEXTY:LF=LF+
L(X):NEXTX:LF=LF/XX:GOSUB3340:GOSUB3740:GOSUB3870:GOTO270
40 K$=INKEY$:IFK$=""THEN40ELSERETURN
50 FORX=1TO2000:NEXT:RETURN
60 FORC=1TO241STEP32:PRINT@C,STRING$(15,32);:NEXT:RETURN
70 FORC=288TO448STEP32:PRINT@C,STRING$(32,32);:NEXT:PRINT@480,STRING$(31,32);:RE
TURN
80 PRINT@416,"";:INPUTN$:FORX=1TOXX:IFN$=N$(X)THENRETURNELSENEXT
90 PRINT@448,N$;" IS NOT WITH YOUR PARTY.";:GOSUB50:PRINT@448,"";:GOTO80
100 X1=1024+(INT((8-YR)/2)*32+INT((16-XR)/2)):X2=X1+XR:Y3=X1+YR*32
110 CLS:FORX=X1TOX2:POKEX,191:POKE(X+YR*32),191:NEXT:FORX=X1TOX3STEP32:POKEX
,191:POKE(X+XR),191:NEXT
120 X4=X1+INT(XR/2):IFDN(0THENPOKEX4,255:POKE(X4+1),255
130 X5=X3+INT(XR/2):IFDS(0THENPOKEX5,175:POKE(X5+1),175
```

```
140 XW=X1+(INT(YR/2))*32:IFDW>0THENPOKEXW,239
150 XE=XW+XR:IFDE>0THENPOKEXE,128
160 IFDU<0THENPOKE(X1+33),150
170 IFDU>0THENPOKE(X1+33),214
180 IFLC=1THENM=X1+66:LC=0
190 IFRN=1THENPOKEXS,0:POKE(XS+1),0:DS=0
200 GOSUB60:PRINT@20,"LEVEL";L;:PRINT@50,"ROOM";XR;"*";YR;:PRINT@83,"CONTENTS:";
 PRINT@115,F$(2);:PRINT@147,F$(3);:PRINT@179,F$(4);
210 IFLF=1 ORPA=E ORR=FF THEN250
220 IFR=R2 THENGOSUB1670:GOTO250
230 RS=RND(6):IFR=1THENRS=1
240 IFRS>3THENGOSUB1640
250 PRINT@288,"ACTION OPTIONS -":PRINT"WEAPONS READIED.":PRINT"PARTY STATUS.:CAR
RIED TREASURE.":PRINT"EXPLORE ROOM."
260 PRINT"DOORS(SECRET) & TRAPS(HIDDEN)." PRINT"SAVE ADVENTURE." PRINT@480,"LOCK
ED DOORS PICK OR FORCE.":RETURN
270 R=1:GOSUB3340:GOSUB100
280 FORZZ=1TO2STEP0:W=M:POKEM,F
290 RS=RND(6):F$=INKEY$:IFF$=""THEN290
300 IFF$="W"THENGOSUB1030
310 IFF$="P"THENGOSUB2240
320 IFF$="E"THENGOSUB1070
330 IFF$="D"THENGOSUB1530
340 IFF$="L"THENGOSUB6670
350 IFF$="C"THENGOSUB2270
360 IFF$="S"THENGOSUB3100
370 IFF$="Y"THENM=M-32
380 IFF$="U"THENM=M-31
390 IFF$="J"THENM=M+1
400 IFF$="M"THENM=M+33
410 IFF$="N"THENM=M+32
420 IFF$="B"THENM=M+31
430 IFF$="G"THENM=M-1
440 IFF$="T"THENM=M-33
450 IFFT>0ANDX=FT ORM=FT+1ORM=FT+32 ORM=FT+33THENGOSUB980
460 P1=PEEK(M)
470 P1=PEEK(M):IFP1=191THENM=W:GOTO570
480 POKE W,0:IFDL=1THEN RS=1
490 IFP1=255THENGOSUB630
500 IFP1=175THENGOSUB670
510 IFP1=239THENGOSUB710
520 IFP1=128THENGOSUB750
530 IFP1=150ORP1=214THENGOSUB790
540 IFP1=191THENGOSUB810
550 IFP1=159THENGOSUB980
560 TN=TN+1:IFTN>100THENGOSUB580
570 NEXTZZ
580 FORW=M+33TOM-31STEP32:FORY=X TO4+XR-2:POKEY,128:NEXTY,X
590 TN=0:GOSUB40:IFF$<>"T"THEN590
600 CL=0:LW=0:S=S+1:IFS>9THENFOR=1TO99:FORV=1TO6:SV$(X,Y)=S$(X,Y):NEXTY,X:S=0
610 IFLI=1THENFOR=1TO99:FORY=1TO5:T$(X,Y)="":NEXTY,X:PRINT"YOU MANAGE TO FIGHT
YOUR WAY    BACK TO THE ENTRANCE BUT LOSE    MOST OF YOUR TREASURE IN THE    DARK.
.":GOSUB40:R=1:GOSUB3340:GOSUB100:RETURN
620 CLS:LI=LI-1:PRINT@230,LI;" TORCHES LEFT":PRINT:"(INC,LANTERNS:OIL=1TORCHES)
":GOSUB40:LF=1:GOSUB100:RETURN
630 IFMN=R OR DL=1THEN650
640 MF=0:IFRS(30RLN=1THEN LN=1:PN=0:GOTO660
650 PR=R:PS=DN:R=DN:GOSUB3340
660 GOSUB100:IFM=1160THENRETURNELSEM=M-32:RETURN
670 IFPS=R OR DL=1THEN690
680 MF=0:IFRS(30RLS=1THEN LS=1:PS=0:GOTO860
690 PR=R:PN=DS:R=DS:GOSUB3340
700 GOSUB100:IFM=1160THENRETURNELSEM=M+32:RETURN
710 IFPN=R OR DL=1THEN730
720 MF=0:IFRS(30RLW=1THEN LW=1:PW=0:GOTO860
730 PR=R:PE=DN:R=DN:GOSUB3340
740 GOSUB100:IFM=1160THENRETURNELSEM=M-1:RETURN
750 IFPE=R OR DL=1THEN770
760 MF=0:IFRS(30RLE=1THEN LE=1:PE=0:GOTO860
770 PR=R:PW=DE:R=DE:GOSUB3340
780 GOSUB100:IFM=1600THENRETURNELSEM=M+1:RETURN
790 LR$=STR$(DU):L$=MID$(LR$,2,1):R$=MID$(LR$,3):L=VAL(L$):R=VAL(R$):LC=1
800 GOSUB3340:GOSUB100:RETURN
810 PR=R:IFSD=XN THENGOSUB3340:GOSUB100:M=XS-32
820 IFSD=XS THENGOSUB3340:GOSUB100:M=M+32
830 IFSD=XW THENGOSUB3340:GOSUB100:M=XE-1
840 IFSD=XE THENGOSUB3340:GOSUB100:M=XW+1
850 RETURN
860 M=W:GOSUB870:PRINT@359,"*** DOOR LOCKED ***":RETURN
870 GOSUB70:P1=PEEK(M-32):P2=PEEK(M+32):P3=PEEK(M-1):P4=PEEK(M+1):IFP1=191ORP1=
96ANDP2=191ORP3=96ANDP4=191ORP3=96ANDP4=191ORP4=96THENPRINT@320,"WHICH DO
OR? YOU ARE NOT STANDING NEAR A  DOOR.":GOSUB40:RETURN
880 GOSUB870:PRINT@323,"WHO WILL TACKLE THE DOOR":GOSUB80
890 IFC$(X,X)="THIEF"THEN910
900 IF DL=-1 THENGOSUB70:PRINT@353,"HA! YOUR THIEF GOT SUCH A LOW   INTELLIGENCE
 THAT HE DOESN'T    REALISE WHEN HE'S FAILED !!!!":RETURN
910 IFC$(X,X)="THIEF"THEN DL=21+L(X,4:IFR$(X,X)="DWARF"THEN DL=DL+10
920 IFC$(X,X)="THIEF"ANDR$(X,X)="HALFLING"THEN DL=DL+5
930 RR=RND(100):IF C$(X,X)="THIEF"ANDRR>DL THENPRINT"YOUR THIEF IS UNSUCCESSFUL.
   NO FURTHER ATTEMPTS ALLOWED!":DL=-1:RETURN
940 IFC$(X,X)="THIEF"ANDRR<DL THENPRINT" * YOUR THIEF IS SUCCESSFUL **":DL=1:RETU
RN
950 IFDL=-2THENGOSUB70:PRINT@320,"YOUR FIGHTERS ARE UNABLE TO MOVETHE VERY SOLID
 DOOR !!!":RETURN
960 IFS(X)>RND(30)OR VAL(B$(X))>RND(100)THEN PRINT"*YOUR FIGHTER SMASHES THE DOO
R    OPEN.....":DL=1:RETURN
970 PRINT"* UNSUCCESSFUL-DOOR TOO SOLID*":DL=-2:RETURN
980 GOSUB70:PRINT@288,"A TRAP DOOR OPENS IN THE FLOOR. THE WHOLE PARTY FALL THRO
UGH.."
990 FORX=1TO6:IFH(X)<1THENH(X)=0ELSEH=INT(.4*RND(6)+.9)*(C(X)+D(X))/(FR(X)+D(X)):
HENH=H(X)-1
1000 FORY=1TO5:IFT$(X,Y)=TF$(53)THEND=0:NEXTY
1010 H(X)=H(X)-D:PRINTN$(X)" SUFFERS";D;" HP DAMAGE"
1020 NEXTX:R=TF:L=L+1:GOSUB40:GOSUB3340:GOSUB100:RETURN
1030 GOSUB70:PRINT@288,"PREPARE WEAPONS FOR -":FORX=1TO6
1040 PRINT@448,"":PRINT@(320+X*32),N$(X);:INPUTW$(X)
1050 IFW$(X)=U$(X)ORW$(X)=H2$(X)ORW$(X)=W3$(X)THENH(X)=0ELSEPRINT@448,N$(X);" DOE
S NOT HAVE A ";W$(X);:GOSUB50:GOTO1040
1060 NEXTX:W=L:GOSUB250:RETURN
1070 IFF=R THENGOSUB70:PRINT@320,"YOU HAVE ALREADY SEARCHED THIS  ROOM. YOUR CO
NTINUED EXAMINATIONREVEALS NOTHING MORE.":GOSUB40:RETURN
```

```
1080 FF=0 GOSUB70 PRINT@320,"WHO IS SEARCHING", GOSUB80 RF=RND(100)
1090 IFRF>IT(X)*1.5+D(X)*1.5THENPRINT@450,"** NOTHING OF VALUE FOUND **" GOSUB50
 RETURN
1100 GOSUB1180 GOSUB70 FORZZ=1TO2STEP0
1110 GOSUB70 PRINT@288,"TAKE, DETECT MAGIC, DROP ITEM," PRINT@320,"AGREE TO LEAV
E ROOM.", GOSUB40 K1$=K$
1120 IFK$="T"ANDAT=0THENGOSUB1240
1130 IFK$="T"ANDAT=1THENPRINT@422,"*ALREADY TAKEN*" GOSUB50
1140 IFK1$="M"THENGOSUB1320
1150 IFK1$="D"THENGOSUB1370
1160 IFK1$="A"THENRETURN
1170 NEXTZZ
1180 G=0 T=0 F(0)=0 F(1)=0 T$="" RT=RND(20) GOSUB70 IFRT>10THENG=RT*7 PRINT@320,
"YOU HAVE UNCOVERED A LEATHER BAGCONTAINING.....";G,"GP." GOSUB40 F$(0)="GOLD" F
(0)=G RETURN
1190 IFRT>3THENG=RT*10 PRINT@320,"YOU'VE FOUND A CACHE OF",RT,"GEMS WORTH 50GP
EACH PLUS",G,"GOLD  COINS." G=RT*50+G GOSUB40 F$(0)="GOLD" F(0)=G RETURN
1200 T=RND(3+L*9) T$=LEFT$(TF$(T),9)
1210 PRINT@320,"A GOOD FIND....YOU'VE DISCOVERED", IFT$<>"CHAINMAIL"ORT$<>"PLATE
MAIL"THENPRINT"A "
1220 IFTF$(T)="GOLDEN CROWN"ORLEFT$(TF$(T),2)="SC"THENPRINTTF$(T)ELSEPRINTT$
1230 GOSUB40 RETURN
1240 GOSUB70 PRINT@320,"WHICH ITEM DO YOU INTEND TAKING" GOSUB40 F$(1)=T$ RF=RND
(100) F(2)=200+RF F(3)=900+RF F(4)=100+RF
1250 FORZ=0TO4 IFK$=LEFT$(F$(Z),1)THEN1270ELSENEXTZ
1260 PRINT"THAT ITEM IS NOT HERE !!" GOSUB50 RETURN
1270 PRINT"WHO WILL CARRY THE ";F$(Z) GOSUB80
1280 IFWE(X)>F(Z)THENPRINT"IT'S TOO HEAVY FOR ";N$(X);"..........OVERLOADED!" GOS
UB50 RETURNELSEIFK$="G"THEN1310
1290 FORY=1TO5 IFT$(X,Y)=""ANDZ=1THENT$(X,Y)=TF$(T) GOTO1310
1300 NEXTY PRINT@448,N$(X)" IS CARRYING TOO MANY ITEMS TO MANAGE ANYMORE." GOSUB5
0 RETURN
1310 PRINTN$(X)" TAKES THE ";F$(Z) GOSUB50 WE(X)=WE(X)-F(Z) G(X)=G(X)+F(0) AT=1 RE
TURN
1320 DM=0 GOSUB70 PRINT@320,"WHO CASTS THE SPELL?", GOSUB80
1330 FORY=1TO8 IFS$(X,Y)="DETECT MAGIC"THEN1350ELSENEXT
1340 PRINT"YOU DO NOT HAVE DETECT MAGIC!", GOSUB50 RETURN
1350 PRINT@352,"WHAT ITEM DO YOU CAST IT ON?", GOSUB40 IFK$=LEFT$(T$,1)THENPRINT
@352,"THE ITEM GLOWS..........YOU HOLD A ";TF$(T) GOSUB40 DM=1 RETURN
1360 GOSUB70 PRINT@358,"**NOTHING HAPPENS**" GOSUB50 RETURN
1370 GOSUB70 PRINT@288,"WHICH ITEM ARE YOU DISCARDING", GOSUB40
1380 IFK$="G"THEN1410
1390 FORX=1TOXX FORY=1TO5 IFK$=LEFT$(T$(X,Y),1)ORK$=LEFT$(F$(Y),1)THEN1520ELSENE
XT Y,X
1400 PRINT@352,"NO-ONE IN YOUR PARTY APPEARS TO HAVE THIS OBJECT.", GOSUB50 RETU
RN
1410 PRINT@320,"WHO IS DISCARDING GOLD" GOSUB80
1420 PRINT@352,"DO YOU WISH TO GIVE THE GOLD TO SOME-ONE ELSE OR LEAVE IT IN THE
ROOM." GOSUB40
1430 IFK$="G"ORK$="L"THENPRINT"HOW MUCH" INPUTG ELSE1420
1440 IFG>G(X)THENPRINT@448,"THIS IS MORE THAN YOU HAVE FOUND" GOSUB50 RETURN
1450 IFK$="G"THENPRINT@448,"WHO TO", INPUTN2$ELSE GOTO1500
1460 FORY=1TOXX IFN2$=N$(Y)THEN1480ELSENEXT
1470 PRINTN2$," IS NOT IN YOUR PARTY" GOSUB50 RETURN
1480 IFG>WE(Y)THENPRINT"THIS IS MORE THAN",N$(Y),"CAN CARRY" GOSUB50 RETURN
1490 G(X)=G(X)-G WE(X)=WE(X)+G G(Y)=G(Y)+G WE(Y)=WE(Y)-G PRINT@448,"TRANSACTION
COMPLETED." GOSUB50 RETURN
1500 IFK$="L"THEN G(X)=G(X)-G WE(X)=WE(X)+G PRINT@448,"THE GOLD VANISHES ON SCAT
TERING ACROSS THE FLOOR." GOSUB50 RETURN
1510 PRINT"HUH!" GOSUB50 RETURN
1520 RF=RND(XX) F$(3)=T$(X,Y) PRINT@384,"O.K.",N$(RF);" PUTS THE ",F$(3);" ONTO
THE FLOOR." GOSUB50 F(3)=0 T$(X,Y)="" RETURN
1530 Z=0 GOSUB70
1540 FORX=1TOXX IFR$(X)="ELF"THENZ=Z+1
1550 NEXT RS=RND(6+2*Z/3)
1560 IFFT>0ANDRS>5THENPRINT@356,"**FLOOR TRAP DETECTED**" POKEFT,159 POKE(FT+1),
159 POKE(FT+32),159 POKE(FT+33),159 GOSUB40 RETURN
1570 P1=PEEK(M-32) P2=PEEK(M+32) P3=PEEK(M-1) P4=PEEK(M+1) IFP1=96ANDP2=96ANDP3=
96ANDP4=96THENPRINT@352,"THERE ARE NO SECRET TRAP-DOORS  DETECTED HERE." GOSUB40
 RETURN
1580 SD=M-32 IFSD=DN ANDDN<0 ANDRS>5.5THENPOKESD,19 R=-1*DN GOTO1630
1590 SD=M+32 IFSD=DS ANDDS<0 ANDRS>5.5THENPOKESD,19 R=-1*DS GOTO1630
1600 SD=M-1 IFSD=DW ANDDW<0 AND RS>5.5THENPOKESD,19 R=-1*DW GOTO1630
1610 SD=M+1 IFSD=DE ANDDE<0 AND RS>5.5THENPOKESD,19 R=-1*DE GOTO1630
1620 PRINT@448,"NOTHING SENCED OR DETECTED." GOSUB40 GOSUB250 RETURN
1630 PRINT@448,"SECRET DOOR DISCOVERED..." RETURN
1640 MM=RND(10+10*L) IFL>2THENMM=INT(MM*LOG(L)) IFMM>60THEN1640
1650 MF=0 NM=RND(XX+2) IFMM>70THENNM=1
1660 IFMM>40ANDMM<51THENNM=1
1670 IFMF=1THENNM=M1 MM=M2
1680 MA=0 [illegible] MF=0 FORY=1TONM MP(Y)=RND(MF) HE=HE+MP(Y) IFL>2THENMP(Y)=INT(MP(Y)
*LOG(L))
1690 NEXT M1=NM [illegible] IFL>2THENMD=INT(L*LOG(L))
1700 HE=(0.7*MF)+15 [illegible] LP
1710 IFNM=0THENNM=1
1720 GOSUB70 PRINT@320,"you are attacked by -" PRINTNM;" ";M$(MM)
1730 PRINT@416,"FIGHT    COMMUNICATE    RUN" GOSUB40 K1$=K$
1740 IFK1$="R"THEN MF=1 M1=NM M2=MM R2=R R=PR GOSUB3340 GOSUB100 M=1160 [illegible] R
ETURN
1750 IFK1$="C"ANDMM<6THENGOSUB1790 RETURN
1760 IFK1$="C"ANDMM>5THENPRINT"THEY IGNORE YOUR SPEECH & ATTACK" GOSUB50 GOSUB1
890 RETURN
1770 IFK1$="F"THENGOSUB1890 RETURN
1780 IFK$=[illegible]THENGOSUB100 RETURNELSEGOTO1730
1790 GOSUB70 PRINT@320,"WHO ATTEMPTS TO COMMUNICATE" GOSUB80
1800 IFRND(100)[illegible]THENPRINT"THEY'RE NOT INTERESTED--attack" GOSUB50 GO
SUB1890 RETURN
1810 GOSUB70 FL=0 PRINT@288,"THE ";M$(MM);" RECOGNISE YOUR" PRINT"FRIENDLY GESTU
RES AND YOUR    / SUPERIOR STRENGTH !"
1820 RS=RND(4)+RND(4) IFRS=8THENPRINT"THEY TELL YOU OF A LEGEND OF A  POWERFUL G
OLDEN CROWN AND SEVEN MAGICAL GEMS SCATTERED & LOST INTHE DEPTHS BELOW!!!"
1830 IFRS=7THENPRINT"THEY TELL YOU THERE IS A HIDDEN REAR EXIT WHICH THEY'VE HEA
RD OFFROM AN OLD HOBGOBLIN !!!"
1840 IFRS=6THENPRINT"THE ";M$(MM);" CONFIDE" PRINT"IN YOU THAT THEY'VE HEARD OF
A  JEWEL OF FABULOUS WEALTH LOST   SOME-WHERE IN THE COMPLEX BELOW".
1850 IFRS=5ORRS=4THENPRINT"THEY SAY THAT THEY ARE JUST     TRAVELLING BY AND AND
 STOPPED TO LOOK INSIDE,THEY BACK OUT SLOWLY"
1860 IFRS=3THENPRINT"TERRIFIED THEY TELL YOU OF FOUL DEMONS & DRAGONS LURKING BE
LOW, AND THEN LEAVE YOU HASTILY !!"
1870 IFRS=2THENPRINT"THEY RELUCTANTLY HINT AT A TALE OF A MAGICAL STONE WHICH IS
```

```
RUMOURED TO GRANT ANY WISH !!"
1880 GOSUB40:RETURN
1890 N=XX
1900 GOSUB70:PRINT@288,"USE WEAPON, MAGIC OR dISENGAGE":GOSUB40:IFK$="M"THENGOSU
B2690:GOSUB50:LF=1:GOSUB100:IFA=6THENRETURNELSEGOSUB70
1910 IFK$="D"THENMF=1:M1=NM:M2=MM:R=RR:FORZ=1TONM:M(Z)=MP(Z):NEXTZ:GOSUB3340:GOS
UB100:M=1160:FL=0:RETURN
1920 IFNM>0THENGOSUB1950
1930 IFNM=0THENGOSUB70:PRINT@322,"THE OPPOSITION IS VANQUISHED.":GOSUB50:GOSUB22
90:RETURN
1940 GOSUB2080:GOTO1900
1950 PRINT@288,"":FORZ=1TOM1:IFMP(Z)<1THEN1960ELSEPRINT@(320+3*Z),Z
1960 NEXT:FORX=1TOXX:PRINT@352,"":PRINT:PRINT:IFH(X)<1THEN2070ELSEPRINT@352,"WHI
CH DOES ";N$(X);" STRIKE"
1970 GOSUB40:Y=VAL(K$):IFY<1ORY>M1 ORMP(Y)<1 THEN1970
1980 CH=20-L(X)-SB(X)-MA:RT=RND(20):D=RND(6)+DB(X)+WD:IFA=4ANDX=1 THEND=D+20
1990 IFRT>CH THEN MP(Y)=MP(Y)-D ELSE ON RND(2)GOTO2040,2050
2000 IFMP(Y)<1THENPRINTM$(MM);Y;" SLAIN",:NM=NM-1:PRINT@(320+3*Y)," ":GOTO2060
2010 ON RND(2)GOTO2020,2030
2020 PRINT"A HIT,CAUSING";D;"DAMAGE.":GOTO2060
2030 PRINT"A MIGHTY STRIKE-";D;"DAMAGE.":GOTO2060
2040 PRINT"YOUR BLOW IS DEFLECTED !":GOTO2060
2050 PRINT"YOUR WILD SWING TOTALLY MISSES."
2060 GOSUB50
2070 IFNM>0THENNEXT:RETURN
2080 FORY=1TOM1:Y1=Y:D=0
2090 IFY>XX ORH(Y1)<1THENY1=RND(XX)
2100 IFMP(Y)<1THEN2230ELSEMH=20-MD-AC(Y1):RT=RND(20):D=RND(INT(4*LOG(L)+4-L)):IF
A=5ANDY1=1 THEND=0
2110 IFH(Y1)<1THEN2230ELSEPRINT@384,"":PRINT@352,M$(MM);Y;" STRIKES AT ";N$(Y1):
PRINT@416,"";
2120 IFRT>MH THENH(Y1)=H(Y1)-D:ON RND(4)GOTO2140,2150,2160
2130 ON RND(3)GOTO2170,2180,2190
2140 PRINT"A BLOW TO THE HEAD-";D;"DAMAGE":GOTO2200
2150 PRINT"YOUR CHEST IS STRUCK!";D;"DAMAGE":GOTO2200
2160 PRINT"A STRIKE TO YOUR ARM ";D;"DAMAGE":GOTO2200
2170 PRINT"YOU SKILLFULLY DEFLECT THE BLOW":GOTO2220
2180 PRINT"SAVED BY YOUR ARMOUR!":GOTO2220
2190 PRINT"YOU DEFTLY AVOID THE BLOW":GOTO2220
2200 IFH(Y1)<1THENPRINT@480,N$(Y1);" -dead!";:N=N-1:GOSUB50
2210 IFN=0THENCLS:PRINT@227,"YOUR PARTY ARE ALL DEAD.":END
2220 GOSUB50
2230 NEXTY:RETURN
2240 GOSUB70:PRINT@296,"*PARTY STATUS*":PRINT@330,"L  HP  AC  GP   WT":FORX=1TOX
X:PRINTN$(X):PRINT@(329+X*32),"";:PRINTUSING"##";L(X);:PRINT" ";
2250 PRINTUSING"##";H(X);:PRINT" ";:PRINTUSING"##";AC(X);:PRINT" ";:PRINTUSING"
####";G(X);:PRINT" ";:PRINTUSING"####";WE(X)
2260 NEXTX:PRINT@480,"TOTAL COMBAT EXPERIENCE ";MT;:GOSUB40:GOSUB250:RETURN
2270 FORX=1TOXX:CLS:PRINTN$(X):FORY=1TO5:PRINTT$(X,Y):NEXT:GOSUB40:NEXT:IFCC=1TH
ENPRINT@384,"* DEAD COMRADE BEING CARRIED *":GOSUB502280 LF=1:GOSUB100:RETURN
2290 MT=INT(MT+HE):HE=0:FORZZ=1TO2STEP0
2300 GOSUB70:PRINT@288," HEAL WOUNDED.   SEARCH BODIES.   lEAVE.";
2310 GOSUB40:IFK$="L"THENRETURN
2320 IFK$="S"THENGOSUB2350
2330 IFK$="H"THENGOSUB2420
2340 NEXTZZ
2350 IFSB=1THENPRINT@384,"YOU'VE ALREADY SEARCHED THE     BODIES - NOTHING MORE
IS FOUND.":GOSUB50:RETURN
2360 FORZ=1TOM1:RT=RND(20):RP=L*RND(100)
2370 PRINT@384,"WHO SEARCHES ";M$(MM);Z;:GOSUB80
2380 IFRT<8THENPRINT@416,"NOTHING FOUND ON ";M$(MM);Z:GOTO2410
2390 RS=INT(RT*L/2):PRINT@416,RS;" GOLD";:IFRT<20THENRP=0ELSEPRINT"+ A GEM WORTH
";RP;"GP"
2400 PRINT" FOUND ON ";M$(MM);Z:IFRP+RS<WE(X)THENWE(X)=WE(X)-RP-RS:G(X)=G(X)+RP
+RS
2410 GOSUB50:PRINT@384,"":PRINT:PRINT:NEXTZ:SB=1:RETURN
2420 H1=0:PRINT@384,"WHO DO YOU WISH TO ADMINISTER TO":GOSUB80:N1$=N$:U=X
2430 FORZ=1TOXX:FORY=1TO5:IFH(U)<1ANDT$(Z,Y)=TF$(50)THENPRINT@416,N$(Z);" HAS A
SCROLL OF RAISE DEAD":H1=2:Z1=Z:Y1=Y
2440 IFH(U)<1ANDT$(Z,Y)=TF$(63)THENPRINT@416,N$(Z);" HAS A RING OF REGENERATION"
:H1=1
2450 IFH(U)<1ANDL(Z)>8ANDC$(Z)="CLERIC"THENPRINT@384,"YOUR";L(Z);"TH LEVEL CLERI
C HAS THE POWER TO BRING ";N$;" BACK TO LIFE.":H1=3
2460 IFH(U)<1ANDL(Z)>11AND(C$(Z)="DRUID"ORC$(Z)="MAGICIAN")THENPRINT@384,N$(Z);"
 HAS THE POWER TO RE-INCARNATE ";N$:H1=4
2470 NEXTY,Z:IFH1>0THENGOSUB50:GOTO2530
2480 IFH(X)<1ANDH1=0THENPRINT@352,"YOUR PARTY HAVE NO MEANS TO HELPYOUR DEAD COM
RADE.WILL YOU CARRYYOURFRIEND,TAKE ITEMS FROM THE  BODY OR lEAVE IT AS FALLEN.";
 GOSUB40:GOSUB2590:RETURN
2490 GOSUB70:PRINT@320,"WHO WILL TEND TO ";N1$;:GOSUB80:IFC$(X)="CLERIC"OR(C$(X)
="DRUID"ANDL(X)>1)ANDCL<L(X)THENCL=CL+1:GOSUB2670:RETURN
2500 IFC$(X)="PALADIN"ANDLH<L(X)THENLH=LH+1:GOSUB2670:RETURN
2510 FORZ=1TOXX:FORY=1TO5:IFT$(Z,Y)=TF$(1)ORT$(Z,Y)=TF$(2)ORT$(Z,Y)=TF$(39)THENH
(U)=H(U)+RND(8)ELSEIFT$(Z,Y)=TF$(16)THENH(U)=H(U)+3*RND(8):IFH(U)>HP(U)THENH(U)=
HP(U):PRINT" ";N1$;" NOW AT";H(U);"HIT POINTS.":GOSUB50:T$(Z,Y)=""
2520 NEXTY,Z:IFCL=0THENPRINT@448,"YOU HAVE NO FACILITY TO HEAL":GOSUB50:RETURNEL
SERETURN
2530 PRINT@448,"DO YOU WISH TO UTILISE THIS     FACILITY(Y/N)";:GOSUB40:IFK$="Y"
THENGOSUB70:H(U)=HP(U):ON H1 GOTO2540,2550,2560,2570 ELSERETURN
2540 N=N+1:PRINT@416,"THE RING GLOWS A BLOOD RED......";N1$;" BEGINS TO STIR..."
;:GOSUB50:PRINT@480,"alive again":GOSUB50:RETURN
2550 N=N+1:PRINT@384,"AS YOU FINISH INTONING FROM THE SCROLL,";N1$;" BEGINS TO B
REATH AGAIN AND THEN....";:T$(Z1,Y1)="":GOSUB50:PRINT"GETS UP HAPPILY!!";:GOSUB5
0:RETURN
2560 N=N+1:PRINT@416,"YOU ARE SUCCESSFUL ";N$(Z):PRINTN1$;" RISES TO FIGHT AGAIN
- ALTHOUGH WEAK AT PRESENT!";:GOSUB50:RETURN
2570 RI$(1)="DWARF":RI$(2)="ELF":RI$(3)="GNOME":RI$(4)="GOBLIN":RI$(5)="HALFLING
":RI$(6)="HALF-ORC":RI$(7)="HUMAN":RI$(8)="CENTAUR":RI$(9)="ORC"
2580 N=N+1:RP=RND(9):PRINT@416,"AS YOU FINISH RECITING YOUR     RE-INCARNATION S
PELL ";N1$;" RISES AGAIN AS.....";:GOSUB50:PRINT"A ";RI$(RP);:R$(U)=RI$(RP):GOSU
B50:RETURN
2590 IFK$="F"ANDCC=1THENPRINT" overloaded   YOU ALREADY CARRY  ONE OF YOUR LATE
COMRADES."
2595 IFK$="F"ANDCC=0THENCC=1:FORY=1TOXX:WE(Y)=0:NEXT:GOTO2660
2600 IFK$<>"F"ANDK$<>"I"THEN2650
2610 FORZ=1TOXX:FORY=1TO5:IFT$(U,Y)=""ORZ=U THEN2630
2620 IFT$(Z,Y)=""THENT$(Z,Y)=T$(U,Y):T$(U,Y)=""
2630 NEXTY,Z:FORX=1TOXX:IFX=U THEN2640ELSELF=INT(G(U)/3):G(X)=G(X)+LF:WE(X)=WE(X
)-LF:IFWE(X)<0THENWE(X)=0
2640 NEXT:G(U)=0
```

```
2650 N$(U)="" C$(U)="" R$(U)="" N1$(U)="" N2$(U)="" N3$(U)="" A$(U)=""
2660 L(U)=0 S(U)=0 I(U)=0 W(U)=0 C(U)=0 X(U)=0 R(U)=0 B$(U)="" GP(U)=0 HP(U)=0 S
B(U)=0 DB(U)=0 WA(U)=0 RC(U)=0 WE(U)=0 RETURN
2670 PS=RND(6)+2 IFRS*H(U)>HP(U)THENRS=HP(U)-H(U)
2680 IFCF=1THENPRINT@352,"YOUR SPELL IS NOT YET RECHARGED YOU MUST RECOVER YOUR
STRENGTH!" RETURNELSEPRINT@352,C$(X)" YOU HAVE CURED" PRINTRS" DAMAGE FOR ",N$
(U), H(U)>H(U)+RS:GOSUB50 CF=1 RETURN
2690 PRINT@320,"WHO CASTS MAGIC...?":GOSUB80:IFH<1THENPRINT"he is dead": R=2
 RETURN
2700 CLS:PRINTN$(X)," YOU KNOW ":FORY=1TO8:PRINTSY$(X,Y);:NEXT
2710 PRINT"YOU CARRY ":FORY=1TO5:PRINTT$(X,Y);:NEXT
2720 PRINT@480,"SPELL OR ARTIFACT?":GOSUB40 IFA$="S"ORA$="A"THEN2730ELSER=2 RE
TURN
2730 IFX$="A"THENLF=1ELSELF=0
2740 IFLF=0THENGOSUB70ELSEFORY=0TO7 PRINT@ 32+Y*8,"" NEXT
2750 PRINT@450,"WHICH.....";:GOSUB40
2760 K=ASC(A$)-64:A$=CHR$(K+96):FORY=1TO5 IFLF=1ANDLEFT$(T$(X,Y),6)+"POTION"ORL
EFT$(T$(X,Y),6)="SCROLL"ANDINSTR(T$(X,Y),A$)>0THENT$(X,Y)=""
2770 IFRND(100)>94ANDINSTR(T$(X,Y),A$)>0ANDLEFT$(T$(X,Y),4)="RING"ORLEFT$(T$(
X,Y),4)="WAND"THENT$(X,Y)="":PRINT" last charge" GOSUB50
2780 NEXT:IFLF=0THENFORY=1TO8 IFINSTR(1,SY$(X,Y),A$)>0THENSY$(X,Y)=""ELSENEXT
2790 IFLF=0THENFORY=1TO8 IFRND(100)>30ANDINSTR(1,SY$(X,Y),A$)>0ANDLEFT$(SY$(X,Y
),4)="RING"ORLEFT$(SY$(X,Y),4)="WAND"THENSY$(X,Y)="":PRINT"last charge":GOSUB50E
LSENEXT
2800 FORSS=105TO1500:IFPEEK(SS)=4:THENSS=2000ELSENEXT
2810 PRINT@480,"NOT AVAILABLE....."  R=2:GOSUB50:RETURN
2820 A=0:C$=LEFT$(C$(X),1):CLS
2830 IFA=2ANDC$="I"ORLF=1THENPRINT"A BLINDING FLASH LIGHTS THE "N$(MM)" ALLOWIN
G YOU TO DESPATCH THEM". A=1
2840 IFA=3ANDC$="I"ORLF=1THENPRINT"THE "N$(MM)" ARE THROWN INTO DISA
RRAY ALLOWING YOU TO STRIKE UNHINDERED.": A=1
2850 IFA=4ANDRIGHT$(N$(MM),6)="DRAGON"THENPRINT"THE DRAGON BECOMES DOCILE AND
LIES DOWN QUIETLY.": A=2
2860 IFX=5ANDC$="D"ORLF=1THENPRINTTHE "N$(MM)" SUDDENLY BECOME ENTANGLED IN
A MASS OF VINES ALLOWING YOU TO KILL THEM.": A=1
2870 IFX=6ANDC$="M"ORC$="D"ORLF=1THENPRINT"FIRE SHOOTS AT THE MONSTERS AND DAM
AGES THEM CONSIDERABELY.": A=3
2880 IFX=7THENPRINT"YOU FEEL A SUDDEN SURGE OF GREATSTRENGTH & CHARGE THE FOE.":
 A=4
2890 IFX=8ANDC$="C"ORLF=1THENPRINT"THE OPPOSITION IS HELD FAST.....UNABLE TO A
TTACK OR DEFEND.": A=2
2900 IFX=9THENPRINTN$(X)," SUDDENLY DISAPPEARS FROM VIEW.": A=5
2910 IFX=12ANDC$="M"ORC$="D"ORLF=1THENPRINT"LIGHTNING BURSTS FORTH FROM YOU.":
 A=1
2920 IFX=13ANDC$="M"ORLF=1THENPRINT"YOU FEEL INVULNERABLE AS AN AURAUF POWER ENVELOPS YOU. YOUR H
ANDS & STRIKE THE "N$(MM), A=3
2930 IFX=14THENPRINT"THE STAFF OF STRIKING CRACKLES WITH POWER & BLUE FLAME BUR
STINGFORTH.": A=3
2940 IFX=15ANDC$="M"ORLF=1THENPRINT"AN ICE STORM ENVELOPES THE "N$(MM)." FREEZI
NG THEM SOLID.", A=2
2950 IFX=16ANDC$="M"ORLF=1THENPRINT"THE "N$(MM)" FALL UNDER YOUR SPELL.": A=
2
2960 IFX=18THENPRINT"THE "N$(MM)" ARE STRUCK WITH FEAR AND FLEE THE ROOM.": A=
6
2970 IFX=19ANDC$="M"ORLF=1THENPRINT"THE "N$(MM)" SUDDENLY FALL TO THE FLOOR,
..ASLEEP!" A=2
2980 IFX=20ANDC$="N"ORLF=1THENPRINT"STRENGTH FLOODS INTO YOU.": A=4
2990 IFX=22THENPRINT"YOU FEEL INVULNERABLE AS AN AURAUF POWER ENVELOPS YOU.": A=
5
3000 IFX=24ANDC$="N"ORLF=1THENPRINT"AS YOU COMPLETE THE SPELL THE "N$(MM)" FA
3010 IFX=25ANDC$="I"ORLF=1THENPRINT"A COLOUR SPRAY CONFUSES THE "N$(MM)." AND
 YOU ARE ABLE TO STRIKE UNHINDERED.": A=1
3020 IFX=26ANDC$="I"ORLF=1THENPRINT"THE "N$(MM)" ARE PARALYZED.": A=2
3030 IFA=1THENNM=0
3040 IFA=2THENRT=(LOG(L)*RND(20))/L(X):IFRT>15THENPRINT" BUT THEY QUICKLY RECO
VER...": ELSENM=0
3050 IFA=3THENFORY=1TONM:MP(Y)=MP(Y)-RND(6)*L(X):IFMP(Y)<1THENNM=NM-1:NEXT
3060 IFA=4THENI=X
3070 IFA=5THENI=X
3080 IFA=6THENRETURN
3090 LF=1:RETURN
3100 CLS:PRINT@5,"*DO YOU WISH TO SAVE*":PRINT@39,"*THESE CHARACTERS*":PRINT@80,
"*":PRINT@104,"*THIS ADVENTURE*"
3110 GOSUB40:IFA$="N"THENGOSUB100:RETURN
3120 PRINT:PRINT" PREPARE TAPE & THEN PRESS       ANY KEY....." GOSUB40
3130 CLS:PRINT@234,"**SAVING**":OPEN"O",#-1,"DUNGEON":PRINT#-1,XX:FORX=1TOXX
3140 PRINT#-1,N$(X),R$(X),C$(X),L(X),S(X),I(X),W(X),C(X),D(X),R(X),B$(X),GP(X),H
P(X),SB(X),DB(X),WA(X),W1$(X),W2$(X),W3$(X)
3150 PRINT#-1,A$(X),RC(X),LI(X),E(X),O(X),G(X),H(X),A(X),WE(X)
3160 FORY=1TO8:PRINT#-1,E$(X,Y),S$(X,Y):NEXTY:FORY=1TO5:PRINT#-1,T$(X,Y):NEXTY,X
:PRINT#-1,MT,R,L,CC,DC
3170 CLOSE#-1:CLS:PRINT@234,"*DUNGEON*":PRINT@267,"*SAVED*":END
3180 '* LOAD ADVENTURE *
3190 CLS:PRINT@32,"YOU'RE IN MID-ADVENTURE..!":PRINT"PREPARE TAPE & PRESS ANY KE
Y.":GOSUB40:CLS:PRINT@234,"* LOADING *":PRINT@266,"* DUNGEON *"
3200 OPEN"I",#-1,"DUNGEON":INPUT#-1,XX:FORX=1TOXX
3210 INPUT#-1,N$(X),R$(X),C$(X),L(X),S(X),I(X),W(X),C(X),D(X),R(X),B$(X),GP(X),H
P(X),SB(X),DB(X),WA(X),W1$(X),W2$(X),W3$(X)
3220 INPUT#-1,A$(X),RC(X),LI(X),E(X),O(X),G(X),H(X),A(X),WE(X)
3230 FORY=1TO8:INPUT#-1,E$(X,Y),S$(X,Y):NEXTY:FORY=1TO5:INPUT#-1,T$(X,Y):NEXTY,X
:INPUT#-1,MT,R,L,CC
3240 CLOSE#-1:FORZ=1TOXX:LI=LI+LI(Z):NEXT:RETURN
3250 'LOAD INITIAL CHARACTERS
3260 CLS:PRINT:PRINT"  ** WELCOME TO BRIMSTONE **":PRINT:PRINT" YOU MAY ADVENTUR
E WITH UP TO    FOUR MEMBERS.":PRINT:PRINT" HOW MANY CHARACTERS WILL YOUR   PART
Y COMPRISE ":INPUTXX
3270 IFXX<1ORXX>4THEN3260
3280 FORX=1TOXX:PRINT:PRINT" PREPARE THE TAPE TO LOAD YOUR   CHARACTER.THEN ENTE
R THE NAME   OF YOUR CHARACTER...":INPUTN$
3290 CLS:PRINT@234,"**LOADING**":OPEN"I",#-1,N$(X):IFEOF(-1)THEN3330
3300 INPUT#-1,N$(X),R$(X),C$(X),L(X),S(X),I(X),W(X),C(X),D(X),R(X),B$(X),GP(X),H
P(X),SB(X),DB(X),WA(X)
3310 INPUT#-1,W1$(X),W2$(X),W3$(X),R$(X),RC(X),LI(X),E(X),O(X)
3320 FORY=1TO8:INPUT#-1,E$(X,Y),S$(X,Y):NEXTY:FORY=1TO5:INPUT#-1,T$(X,Y):NEXTY
3330 CLOSE#-1:H(X)=HP(X):WE(X)=WA(X):PRINT@234,"***DONE***":NEXTX:FORZ=1TOXX:LI=
LI+LI(Z):NEXTZ:RETURN
3340 HE=0:LF=0:CF=0:AT=0:OL=0:LN=0:LS=0:LW=0:LE=0:TR=30:SB=0
3350 RESTORE:FORX=1TO7:READ XR,YR,PN,DN,DS,DW,DE,DU,FT,F$(2),F$(3),F$(4):NEXT:RE
TURN
```

```
3360 DATA16,7,1,2,0,3,0,0,0,0,ENTRANCE,CHAMBER,16,8,2,-5,1,4,0,0,0,0,EMPTY,ROOM
3370 DATA10,6,3,4,0,0,1,0,0,TABLE,CHAIRS,12,6,4,0,3,0,2,0,0,0,,BENCHES
3380 DATA4,8,5,6,-2,0,0,0,0,,CORRIDOR,8,8,6,7,5,0,0,0,0,0,GUARD,ROOM
3390 DATA8,8,7,0,6,-8,0,0,0,0,,NOTHING,8,8,8,0,0,0,9,-7,0,0,,ARMOURY
3400 DATA8,8,9,10,0,19,8,0,1126,,EMPTY,ROOM,4,8,10,11,2,0,0,0,0,0,,CORRIDOR
3410 DATA6,8,11,0,10,0,0,0,0,0,TABLE,AND,BENCHES,6,8,12,-19,-13,0,0,0,0,0,,SECRET,RO
OM

3420 DATA8,8,13,-12,0,14,0,0,0,0,STORE,ROOM,ARMOUR,6,4,14,0,0,15,13,0,0,0,,CORRIDOR
3430 DATA14,7,15,0,16,18,14,0,0,0,,RECEPTION,ROOM,12,6,16,15,0,0,-17,0,0,0,0,,THRONE,R
OOM
3440 DATA6,6,17,0,0,0,0,-16,-221,0,BARE,STONE,CHAMBER,10,4,18,0,0,0,0,15,0,0,0,,GUARD,
ROOM
3450 DATA8,8,19,0,-12,-20,9,0,0,,EMPTY,CORRIDOR,13,5,20,0,0,0,-19,0,0,0,,WASH,ROOM
3460 DATA7,7,21,22,0,0,0,0,117,0,DARK,STAIR,WELL,4,8,22,23,21,0,0,0,0,0,,CORRIDOR
3470 DATA14,8,23,-24,22,0,0,0,0,0,ROOM,OF,MIRRORS,14,6,24,0,-23,0,25,0,0,0,,STUDY,RO
OM
3480 DATA12,6,25,-26,0,24,0,0,0,0,,LIBRARY,,6,6,26,0,-25,0,0,-338,0,0,,EMPTY,ROOM
3490 DATA12,8,27,0,0,0,28,0,0,0,,LABORATORY,,12,6,28,29,0,27,0,0,0,0,OFFICE,WITH,DES
K

3500 DATA12,6,29,-30,28,0,-31,0,0,0,,WHITE,CHAMBER,12,6,30,0,-29,0,0,0,0,0,LAMP,&,DIR
TY,CELL
3510 DATA16,4,31,0,0,0,-29,32,0,0,0,,CORRIDOR,,14,8,32,33,0,31,0,0,0,0,BENCHES,AND,TAB
LES
3520 DATA8,6,33,0,42,0,0,0,-334,0,,SMALL,CHAPEL,6,6,34,0,0,0,-35,0,280,0,0,EMPTY,STAIR
,WELL
3530 DATA16,6,35,0,0,0,36,-34,0,0,0,,ROBING,ROOM,16,0,36,0,0,-39,37,15,0,0,0,LARGE,THRON
E,ROOM
3540 DATA8,8,37,0,0,0,-38,36,0,0,0,SMALL,DRESSING,ROOM,8,7,38,0,0,0,0,-37,226,0,0,GUARD,
ROOM,2,STAIRS
3550 DATA10,8,39,-36,40,0,0,0,0,0,,TROPHY,CHAMBER,8,8,40,39,0,0,0,0,441,0,0,SMALL,SITT
ING,ROOM
3560 DATA6,8,41,0,42,0,-32,340,0,0,STORE,(FOOD),ROOM,16,8,42,41,43,0,0,0,0,0,,LARGE,
KITCHEN
3570 DATA14,8,43,42,44,0,0,0,0,0,,BANQUET,ROOM,16,8,44,42,0,0,45,0,0,0,,GREAT,HALL
3580 DATA14,8,45,0,0,44,46,0,0,0,LARGE,DINING,ROOM,12,7,46,0,0,0,45,-47,0,0,0,COMBINED
,PANTRY,&,KITCHEN
3590 DATA8,8,47,48,0,-46,0,-557,0,,LOUNGE,,5,8,48,49,47,0,0,0,0,0,,CORRIDOR
3600 DATA12,8,49,-50,48,0,0,0,0,0,SERVANT'S,DORMITORY,,8,8,50,0,-49,0,0,-553,0,0,ST
ORE,ROOM
3610 DATA16,4,51,0,0,52,-50,0,0,0,,CORRIDOR,,14,8,52,0,0,-41,51,0,0,0,,LARGE,REFRECT
ORY
3620 DATA8,8,53,0,56,0,54,450,0,0,STORE,ROOM,,8,8,54,0,55,53,0,0,0,0,,UNTIDY,WORKSHO
P

3630 DATA8,8,55,54,0,56,0,-658,0,,EMPTY,ROOM,8,8,56,53,0,0,55,0,0,0,SMALL,WEAPONS,
SMITH
3640 DATA10,8,57,0,0,0,0,447,0,,EMPTY,CELL,8,8,58,0,64,0,-59,555,0,0,EMPTY,CELL
3650 DATA16,5,59,0,0,0,-58,60,0,0,0,,CORRIDOR,,14,8,60,61,0,59,0,0,0,0,,BARRACKS
3660 DATA14,8,61,0,60,62,0,0,0,0,SEVERAL,CRUDE,BEDS,16,8,62,0,0,0,-63,61,0,0,TRAININ
G,EXERCISE,ROOM,G/M
3670 DATA8,8,63,0,0,0,0,-62,-771,0,EMPTY,STAIR,WELL,4,0,64,58,65,0,0,0,0,0,,CORRIDO
R

3680 DATA6,8,65,64,0,0,66,0,0,0,,TORTURE,CHAMBER,8,8,66,0,67,65,0,0,0,0,,PRISON,CELL
S
3690 DATA8,8,67,66,0,0,68,0,0,0,,GUARD'S,ROOM,8,8,68,0,0,0,67,67,0,0,0,0,MORE,PRISON,CEL
LS
3700 DATA8,8,69,68,0,0,0,-70,0,0,,STRONG,ROOM,8,8,70,0,0,0,-69,0,0,0,0,SECRET,CHAMBER
3710 DATA8,8,71,72,74,73,75,663,0,DARK,EERIE,ROOM,8,8,72,0,71,0,0,0,0,0,SLIME,COVE
RED,WALLS
3720 DATA8,8,73,0,0,0,71,0,0,0,FOUL,SMELLING,BESTIARY,6,6,74,71,0,0,0,0,0,0,DARK,GLO
OMY,CRYPT

3730 DATA6,6,75,0,0,71,0,0,0,,SEVERAL,TOMBS
3740 FOR%=1TO6:READTF$(%):NEXT:RETURN
3750 DATA POTION...OF HEALING,SCROLL...OF CURE LIGHT WOUNDS,SCROLL...OF eNTANGLE
,SCROLL...OF mAGIC MISSILE
3760 DATA SCROLL...OF CHARM PERSON,sCROLL...OF sLEEP SCROLL...OF COLOUR SPRAy,RI
NG,...OF wARMTH,WAND,...OF mAGIC MISSILES
3770 DATA CHAINMAIL+1,SHIELD...+1,SWORD....+1,AXE.....+1,DAGGER...+1,MACE....+1
3780 DATA POTION...OF EXTRA-HEALING,SCROLL...OF hOLD PERSON,SCROLL...OF INVULNER
ABILITY,SCROLL... OF BLINDNESS,RING....OF iNVISIBILITY,CLOAK....OF PROTECTION+1
3790 DATA DAGGER...+2,SWORD....+2,AMULET OF GOLD & PLATINUM,BAG.....OF DEVOURING
3800 DATA POTION...OF iNVISIBILITY,SCROLL...OF CALL lIGHTNING SCROLL...OF iNVISI
BILITY,SCROLL...OF PARALYZATION,RING....OF PROTECTION+1,WAND.....OF FIRE
3810 DATA CHAINMAIL+2,SHIELD...+2,AXE.....+2,SPEAR....+2,RED FEARL,SAPPHIRE
3820 DATA POTION...OF INVULNERABILITY,SCROLL...OF CURE DISEASE SCROLL...OF STREN
GTH,SCROLL...OF lIGTHNING BOLT,SCROLL...OF FIREBALL,SCROLL...OF CHAOS,WAND.....O
F FEAr

3830 DATA PLATEMAIL+1,SWORD....+3,EMERALD STAR RUBY
3840 DATA POTION...OF gIANT STRENGTH,SCROLL...OF RAISE DEAD,SCROLL...OF WALL OF
fIRE,SCROLL...OF ICE STORM,RING.....OF FEATHER FALL,WAND.....OF STRIKING
3850 DATA AXE.....+3,DAGGER...+3,MACE.....+2,FIRE OPAL,DIAMOND,,,
3860 DATA POTION...OF dRAGON CONTROL,SCROLL...OF cONFUSION,SCROLL...OF DEATH SPE
LL,,,,,RING.....OF REGENERATION,PLATEMAIL+2,MOONSTONE,CROWN OF GOD
3870 FOR%=1TO60:READM$(%):NEXT:RETURN
3880 DATA BANDIT,BERSERKER,ORC,GOBLIN,KOBOLD,GHOUL,GNOLL,IMP,GIANT RAT,BUGBEAR
3890 DATA LIZARDMEN,CARRION CRAWLER,GIANT RAT,SKELETON,STIRGE,GIANT CENTIPEDE,WO
LVEN,TROGLODYTE,EVIL DWARVES,SHRIEKER
3900 DATA HOBGOBLIN,FIRE-IMP,GIANT TICK,HARPIES,MUMMIES,MANE,LEMURE,LARVA,FIRE B
EETLE,WEREWOLVES
3910 DATA OGRE,OWLBEAR,GIANT SPIDER,TROLL,ZOMBIE,BASILISK,CAVE BEAR,BLINK DOG,CE
NTAUR,COCKATRICE
3920 DATA SUCCUBUS,HARPIES,ERINYES,LAMIA,SPECTRE,HYDRA,GELATINOUS CUBE,GHOST,STO
NE GIANT,STONE GOLEM
3930 DATA CHIMERA,COUATL,GIANT APE,GIANT SPIDER,ETTIN,GORGON,GRIFFON,GARGOYLE,MIN
OTICORE,MINOTAUR
3940 DATA ROPER,RUST MONSTER,VAMPIRE,UMBER HULK,WIGHT,WYRN,WYVERN,WRAITH,D'JINNI
,OTYUGH,MIND FLAYER,LICH
3950 DATA IRON GOLEM,BALROG,DRAGONNE,BLACK,DRAGON,CHROMATIC,DRAGON,GREEN DRAGON
RED DRAGON,WHITE DRAGON
```

Spectrum Golf

by Chic James

As the name says, this is a golf simulation for the Sinclair Spectrum. Instructions are included in the program for nine- and 18-hole games.

If two people want to play simultaneously, you'll need a microdrive in which to store the hole design. One-player games can be run on cassette-based systems.

One word of warning — the game is won or lost on the putting green.

```
    1 REM "golf" BY CHIC JAMES
    5 BRIGHT 1
    8 BORDER 5: PAPER 4: INK 0
    9 CLS : GO SUB 9100
   10 GO SUB 9900
   15 GO SUB 9700
   30 PRINT  PAPER 7; BRIGHT 1; I
NVERSE 1;AT 20,0;"HOW MANY HOLES
 DO YOU WISH TO   PLAY ?
                  "
   40 INPUT  PAPER 7; INK 0; BRIG
HT 1;"ENTER 9 or 18 ";h
   45 CLS
   50 INPUT  PAPER 7; INK 0; BRIG
HT 1;"ENTER 1 or 2 PLAYERS ";pla
yers
   60 IF players>2 THEN  GO TO 50
   90 GO SUB 1000
  100 REM ** play one hole **
  105 INPUT  PAPER 2; INK 7;"PLAY
ER ";(p1);" ENTER ANGLE:";a
  107 IF a>180 THEN  GO TO 3003
  110 PRINT AT 1,0; PAPER 2; INK
7;"ANGLE ";a;"    "
  120 INPUT  PAPER 1; INK 7;"PLAY
ER ";(p1);" ENTER SWING:";d
  125 IF d>200 THEN  GO TO 120
  130 PRINT AT 2,0; PAPER 1; INK
7;"SWING ";d;"    "
  135 LET d=d/2
  140 LET x=INT (d*COS (a/180*PI)
)+q
  150 LET y=INT (d*SIN (a/180*PI)
)+r
  155 GO SUB 6080
  160 CIRCLE  INK 7;x,y,1
  163 IF x>=c-20 AND x<=c+20 AND
y>=b-20 AND y<=b+20 THEN  GO TO
170
  165 PLOT q,r: DRAW x-q,y-r
  170 LET q=x
  180 LET r=y
  190 IF x>=c-1 AND x<=c+1 AND y>
=b-1 AND y<=b+1 THEN  GO TO 3000
  200 GO SUB 6000
  290 LET s=s+1
  295 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
  320 GO TO 105
  999 REM *** set out hole ***
 1000 IF p1=2 THEN  GO TO 1600
 1002 CLS : FOR n=0 TO 2: PRINT A
T n,0; PAPER 0;"
                ": NEXT n
 1005 LET z=z+1: PRINT AT 1,16; P
APER 0; INK 7;"HOLE No. ";z
 1010 LET q=10: LET r=10
 1030 LET s=1
 1100 FOR n=1 TO 30
 1110 LET a=3+INT (RND*18)
 1120 LET b=1+INT (RND*31)
 1130 PRINT AT a,b; PAPER 8; INK
0;"."
 1140 NEXT n
 1150 FOR n=1 TO 5
 1160 LET a=3+INT (RND*13)
 1170 LET b=1+INT (RND*27)
 1180 LET c=1+INT (RND*5)
 1190 FOR m=1 TO c
 1200 PRINT AT a+m,b; PAPER 6; IN
K 0;"#"
 1210 NEXT m
 1220 NEXT n
 1230 LET i=3+INT (RND*15)
 1240 LET j=1+INT (RND*27)
 1245 PRINT AT i-1,j-1; PAPER 3;
INK 2;"  F  "
 1250 PRINT AT i,j-1; PAPER 3;"
   "
 1260 PRINT AT i+1,j-1; PAPER 3;"
      "
 1270 PRINT AT i+2,j-1; PAPER 3;"
      "
 1275 PRINT AT i+3,j-1; PAPER 3;"
      "
 1280 LET c=j*8+12
 1290 LET b=175-(i*8+10)
 1300 CIRCLE c,b,2
 1310 GO SUB 5000
 1320 PRINT AT i+1,j+1; PAPER 3;"
 "
 1330 CIRCLE c,b,2
 1370 PRINT AT 0,16; PAPER 0; INK
 7;"TOTAL STROKES:";e(p1)
 1390 PRINT AT 1,0; PAPER 2; INK
7;"ANGLE        ";AT 2,0; PAPER
1; INK 7;"SWING         "
 1395 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
 1400 LET l=c+b
 1405 IF l>=10 THEN  LET p=2
 1410 IF l>=100 THEN  LET p=3
 1420 IF l>=200 THEN  LET p=4
 1430 IF l>=300 THEN  LET p=5
 1440 PRINT AT 2,16; PAPER 0; INK
 7;"PAR:";p;" ";l;"Yds."
 1450 FOR n=19 TO 21
 1460 PRINT AT n,0; PAPER 6;"    "
 1470 NEXT n
 1480 PRINT AT 19,0; PAPER 6; INK
 0;"T"
 1490 PRINT  PAPER 8;AT 10,15;"."
;AT 11,16;"";AT 17,15;".";AT 11
,22;"."
 1500 PRINT  PAPER 8;AT 8,4;".";A
T 8,11;".";AT 8,18;".";AT 8,26;"
."
 1510 PRINT  PAPER 8;AT 15,4;".";
AT 15,11;".";AT 15,18;".";AT 15,
26;"."
 1520 CIRCLE  INK 7;q,r,1
 1530 IF players=1 THEN  GO TO 10
0
 1549 REM *** SAVE HOLE ***
 1550 ERASE "m";1;"hole"
 1560 SAVE *"m";1;"hole"SCREEN$
 1565 VERIFY *"m";1;"hole"SCREEN$

 1570 GO TO 100
 1599 REM *** LOAD HOLE ***
 1600 LOAD *"m";1;"hole"SCREEN$
 1610 LET q=10: LET r=10
 1620 LET s=1
 1630 PRINT AT 0,16; PAPER 0; INK
 7;"TOTAL STROKES:";e(p1)
 1640 GO TO 100
 2999 REM *** holed shot ***
 3000 LET e(p1)=e(p1)+s: PRINT AT
 21,8;"PAPER 2; INK 7; FLASH 1;"
    H O L E D     "
 3005 GO SUB 7300
 3010 PRINT AT 0,16; PAPER 0; INK
 7;"TOTAL STROKES:";e(p1)
 3015 PAUSE 100
 3016 IF p1=1 THEN  LET t(z)=s
 3017 IF p1=2 THEN  LET i(z)=s
 3018 LET v(z)=p
 3020 PRINT AT 10,6; PAPER 6; INK
 0;s;" STROKES FOR HOLE No.";z
 3021 IF players=1 THEN  GO TO 30
```

```
25
3022 IF p1=1 THEN  LET p1=2: PAU
SE 100: GO TO 1000
3025 LET k=k+p
3030 PRINT AT 2,16; PAPER 0; INK
 7;"PAR:";p;" ";l;"Yds."
3035 PAUSE 100
3040 LET p=0: LET l=0
3050 IF z=h THEN  GO TO 4000
3055 LET p1=1
3060 GO TO 1000
3999 REM *** end of round ***
4000 CLS : PRINT  BRIGHT 1;AT 0,
3; PAPER 7; INK 0;"PAR FOR THIS
COURSE WAS:";k
4002 GO SUB 4500
4005 LET p1=1
4010 IF k=e(p1) THEN  GO TO 4100
4020 IF k>e(p1) THEN  GO TO 4200
4030 IF k<e(p1) THEN  GO TO 4300
4100 IF p1=1 THEN  LET x1=0
4102 IF p1=2 THEN  LET x1=16
4105 PRINT AT 1,x1; PAPER 3; INK
 7;" PLAYER ";p1;AT 21,x1;e(p1);
"; LEVEL PAR "
4115 IF players=1 THEN  GO TO 44
00
4120 IF p1=1 THEN  LET p1=2: GO
TO 4010
4130 GO TO 4400
4200 LET u=k-e(p1)
4202 IF p1=1 THEN  LET x1=0
4203 IF p1=2 THEN  LET x1=16
4210 PRINT AT 1,x1; PAPER 1; INK
 7;" PLAYER ";p1;AT 21,x1;e(p1);
";";u;" UNDER PAR "
4225 IF players=1 THEN  GO TO 44
00
4230 IF p1=1 THEN  LET p1=2: GO
TO 4010
4240 GO TO 4400
4300 LET o=e(p1)-k
4302 IF p1=1 THEN  LET x1=0
4303 IF p1=2 THEN  LET x1=16
4310 PRINT AT 1,x1; PAPER 2; INK
 7;" PLAYER ";p1;AT 21,x1;e(p1);
";";o;" OVER PAR  "
4325 IF players=1 THEN  GO TO 44
00
4330 IF p1=1 THEN  LET p1=2
4410 INPUT  BRIGHT 1; INK 7; PAP
ER 0; FLASH 1;"ANOTHER ROUND? (Y
 or N) ";c$
4420 IF c$="y" THEN  GO TO 15
4430 IF c$<>"y" THEN  STOP
4500 PRINT AT 1,11;"PAR";AT 1,28
;"HOLE"
4505 FOR n=1 TO h
4510 PRINT AT n+1,5;t(n);AT n+1,
12;v(n);AT n+1,21;i(n);AT n+1,29
;n
4520 NEXT n
4530 RETURN
4998 REM ** set up hazards **
4999 REM ** cap's in " " =
                 U.D.G's. **
5000 FOR n=1 TO 3
5002 LET q(n)=3+INT (RND*12)
5003 GO SUB 7000
5005 FOR m=q(n) TO q(n)+2
5010 PRINT AT m,ch; PAPER 8; INK
 5;"■"
5020 NEXT m
5022 NEXT n
5025 FOR n=4 TO 5
5030 LET q(n)=3+INT (RND*12)
5032 GO SUB 7000
5035 FOR m=q(n) TO q(n)+2
5040 PRINT AT m,ch; PAPER 8; INK
 2;"▼▼▼"
5050 NEXT m
5055 NEXT n
5100 FOR n=7 TO 10
5110 LET q(n)=1+INT (RND*28)
5120 LET w(n)=q(n)*8
5125 LET f(n)=w(n)+23
5127 GO SUB 7100
5130 PRINT AT ch,q(n); PAPER 8;
INK 6;"▬▬"
5140 NEXT n
5150 LET n=6
5160 LET q(n)=4+INT (RND*25)
5170 LET w(n)=q(n)*8
5180 LET f(n)=w(n)+23
5190 GO SUB 7100
5200 FOR m=ch TO ch+2
5210 PRINT AT m,q(n); PAPER 8; I
NK 2;"▼▼▼"
5220 NEXT m
5230 IF n=11 THEN  RETURN
5240 LET n=11: GO TO 5160
5999 REM ** check hazards **
6000 GO TO 8000
6005 IF x>=64 AND x<=71 AND y>=w
(1) AND y<=f(1) THEN  GO TO 6100
6010 IF x>=136 AND x<=143 AND y>
=w(2) AND y<=f(2) THEN  GO TO 61
00
6020 IF x>=192 AND x<=199 AND y>
=w(3) AND y<=f(3) THEN  GO TO 61
00
6030 IF x>=w(10) AND x<=f(10) AN
D y>=40 AND y<=47 THEN  GO TO 62
00
6035 IF x>=w(7) AND x<=f(7) AND
y>=112 AND y<=119 THEN  GO TO 62
00
6040 IF x>=w(8) AND x<=f(8) AND
y>=96 AND y<=103 THEN  GO TO 620
0
6050 IF x>=w(9) AND x<=f(9) AND
y>=56 AND y<=63 THEN  GO TO 6200
6060 IF x>=8 AND x<=31 AND y>=w(
4) AND y<=f(4) THEN  GO TO 6300
6065 IF x>=w(11) AND x<=f(11) AN
D y>=0 AND y<=23 THEN  GO TO 630
0
6070 IF x>=w(6) AND x<=f(6) AND
y>=128 AND y<=151 THEN  GO TO 63
00
6075 IF x>=224 AND x<=247 AND y>
=w(5) AND y<=f(5) THEN  GO TO 63
00
6077 RETURN
6079 REM * check out of bounds *
6080 IF x<1 THEN  GO TO 6400
6085 IF x>254 THEN  GO TO 6500
6087 IF y>=152 THEN  GO TO 6600
6090 IF y<1 THEN  GO TO 6700
6095 RETURN
6099 REM ** inform penalty's **
6100 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" IN THE WATER:LOSE
TWO STROKES "
6105 GO SUB 7200
6110 LET s=s+2
6120 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6130 PAUSE 50
6140 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
          "
6145 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▼▼▼"
6150 RETURN
6200 PRINT AT 21,5; PAPER 6; INK
 0; FLASH 1;" BUNKERED:LOSE ONE
STROKE "
6205 GO SUB 7200
6210 LET s=s+1
6220 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6230 PAUSE 50
6240 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
          "
6245 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▼▼▼"
6250 RETURN
6300 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" IN THE WOODS :LOSE
 ONE STROKE "
6305 GO SUB 7200
6310 LET s=s+1
6320 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6330 PAUSE 50
6340 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
          "
6345 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▼▼▼"
```

```
6350 RETURN
6400 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" OUT OF BOUNDS:LOSE
 ONE STROKE "
6405 GO SUB 7200
6410 LET s=s+1
6420 LET x=1
6430 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6435 PAUSE 50
6440 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
      "
6445 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▚▚▚"
6450 RETURN
6500 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" OUT OF BOUNDS:LOSE
 ONE STROKE "
6505 GO SUB 7200
6510 LET s=s+1
6520 LET x=254 *
6530 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6535 PAUSE 50
6540 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
      "
6545 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▚▚▚"
6550 RETURN
6600 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" OUT OF BOUNDS:LOSE
 ONE STROKE "
6605 GO SUB 7200
6610 LET s=s+1
6620 LET y=151
6630 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6635 PAUSE 50
6640 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
      "
6645 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▚▚▚"
6650 RETURN
6700 PRINT AT 21,0; PAPER 6; INK
 0; FLASH 1;" OUT OF BOUNDS:LOSE
 ONE STROKE "
6705 GO SUB 7200
6710 LET s=s+1
6720 LET y=1
6730 PRINT AT 0,0; PAPER 0; INK
7;"STROKE No. ";s
6735 PAUSE 50
6740 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
      "
6745 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▚▚▚"
6750 RETURN
6999 REM ** check hazards sub **
7000 IF q(n)=3 THEN  LET w(n)=12
8: LET f(n)=w(n)+23: GO TO 7100
7001 IF q(n)=4 THEN  LET w(n)=12
0: LET f(n)=w(n)+23: GO TO 7100
7002 IF q(n)=5 THEN  LET w(n)=11
2: LET f(n)=w(n)+23: GO TO 7100
7003 IF q(n)=6 THEN  LET w(n)=10
4: LET f(n)=w(n)+23: GO TO 7100
7004 IF q(n)=7 THEN  LET w(n)=96
: LET f(n)=w(n)+23: GO TO 7100
7005 IF q(n)=8 THEN  LET w(n)=88
: LET f(n)=w(n)+23: GO TO 7100
7006 IF q(n)=9 THEN  LET w(n)=80
: LET f(n)=w(n)+23: GO TO 7100
7007 IF q(n)=10 THEN  LET w(n)=7
2: LET f(n)=w(n)+23: GO TO 7100
7008 IF q(n)=11 THEN  LET w(n)=6
4: LET f(n)=w(n)+23: GO TO 7100
7009 IF q(n)=12 THEN  LET w(n)=5
6: LET f(n)=w(n)+23: GO TO 7100
7010 IF q(n)=13 THEN  LET w(n)=4
8: LET f(n)=w(n)+23: GO TO 7100
7011 IF q(n)=14 THEN  LET w(n)=4
0: LET f(n)=w(n)+23: GO TO 7100
7100 IF n=1 THEN  LET ch=8
7105 IF n=2 THEN  LET ch=17
7110 IF n=3 THEN  LET ch=24
7115 IF n=4 THEN  LET ch=1
7120 IF n=5 THEN  LET ch=28
7125 IF n=6 THEN  LET ch=3
7130 IF n=7 THEN  LET ch=7
7135 IF n=8 THEN  LET ch=9
7140 IF n=9 THEN  LET ch=14
7145 IF n=10 THEN  LET ch=16
7150 IF n=11 THEN  LET ch=19
7160 RETURN
7199 REM *** beep ***
7200 FOR n=1 TO 3
7205 BEEP .50,-10
7210 BEEP .75,-20
7220 NEXT n
7230 RETURN
7300 FOR n=1 TO 16
7305 BEEP .02,n
7310 NEXT n
7320 RETURN
7999 REM ** hit tree routine **
8000 IF x>=32 AND x<=39 AND y>=1
04 AND y<=111 THEN  GO TO 8100
8005 IF x>=88 AND x<=95 AND y>=1
04 AND y<=111 THEN  GO TO 8100
8010 IF x>=144 AND x<=151 AND y>
=104 AND y<=111 THEN  GO TO 8100
8015 IF x>=208 AND x<=215 AND y>
=104 AND y<=111 THEN  GO TO 8100
8020 IF x>=208 AND x<=215 AND y>
=48 AND y<=55 THEN  GO TO 8100
8025 IF x>=144 AND x<=151 AND y>
=48 AND y<=55 THEN  GO TO 8100
8030 IF x>=88 AND x<=95 AND y>=4
8 AND y<=55 THEN  GO TO 8100
8035 IF x>=32 AND x<=39 AND y>=4
8 AND y<=55 THEN  GO TO 8100
8040 IF x>=120 AND x<=127 AND y>
=88 AND y<=95 THEN  GO TO 8100
8045 IF x>=120 AND x<=127 AND y>
=32 AND y<=39 THEN  GO TO 8100
8050 IF x>=128 AND x<=135 AND y>
=80 AND y<=87 THEN  GO TO 8100
8055 IF x>=176 AND x<=183 AND y>
=80 AND y<=87 THEN  GO TO 8100
8060 GO TO 6005
8100 FOR n=5 TO 10
8105 BEEP .01,n
8110 NEXT n
8120 LET y=y+INT (d/3)
8130 PRINT AT 21,0; PAPER 6; INK
 0;" HIT TREE : BALL REBOUNDED
    "
8140 PAUSE 50
8150 PRINT AT 21,0; PAPER 6;"
"; PAPER 4;"
8160 PRINT AT 21,q(11); PAPER 4;
 INK 2;"▚▚▚"
8190 GO TO 160
9099 REM *** golf rules ***
9100 PRINT AT 0,0;" GOLF "
9110 PRINT AT 1,0; PAPER 6; INK
0;"T   "; PAPER 7; INK 0;" THE TE
E WILL BE AT THE       "
9120 PRINT AT 2,0; PAPER 6; INK
0;"    "; PAPER 7; INK 0;" BOTTOM
 LEFT OF YOUR SCREEN  "
9130 PRINT AT 3,0; PAPER 6; INK
0;"    "
9140 CIRCLE 10,156,1
9150 PAUSE 100
9160 PRINT AT 3,1; PAPER 6; INK
2;"^t"; PAPER 7; INK 2;"he ball"
9170 PAUSE 200
9180 PRINT AT 5,0; PAPER 3; INK
2;" ▶ "; PAPER 7; INK 0;" THE GR
EEN WILL BE AT A       "
9190 PRINT AT 6,0; PAPER 3; INK
0;" o "; PAPER 7;" RANDOM POSITI
ON ON THE       "
9200 PRINT AT 7,0; PAPER 3; INK
0;"    "; PAPER 7;"
        COURSE"
9205 PAUSE 100
9210 PRINT AT 7,1; PAPER 3; INK
2;"^t"; PAPER 7; INK 2;"he hole"
9215 PAUSE 100
9220 PRINT AT 9,0;"YOU DECIDE TH
E STRENGTH AND       ANGLE OF YOUR
 SHOTS                "
9230 PRINT AT 12,0;"AVOIDING THE
 HAZARDS"
9235 PAUSE 100
9240 PRINT AT 13,0;"WATER "; PAP
```

```
ER 8; INK 5;"■"; PAPER 7; INK 0;
"  LOSES TWO STROKES      "
9250 PRINT AT 14,0;"BUNKERS "; P
APER 8; INK 6;"▄▄▄"; PAPER 7; IN
K 0;"  LOSE ONE STROKE     "
9260 PRINT AT 15,0;"WOODS "; PAP
ER 8; INK 2;"♣♣♣"; PAPER 7; INK
0;"  LOSE ONE STROKE      "
9270 PRINT AT 17,0;"OUT OF BOUND
S LOSES ONE STROKE "
9280 PRINT AT 18,0;"THE FENCES #
##  AND OTHER TREES  ♣ DO NOT LOS
E YOU STROKES BUT    YOU MAY REBO
UND OFF SOME OF THE TREES."
9290 PRINT  INVERSE 1;0;"PRESS
ANY KEY TO CONTINUE"
9300 PAUSE 0
9310 CLS
9320 PRINT AT 0,0;"STRENGTH AND
ANGLE OF SHOT"
9330 PRINT AT 2,0; PAPER 1; INK
7;"STRENGTH"
9340 PAUSE 50; PRINT AT 4,1; PAP
ER 7; INK 0;"10"; CIRCLE 10,132,
1; DRAW 5,0: CIRCLE 15,132,1
9350 PAUSE 50: PRINT AT 6,1; PAP
ER 7; INK 0;"25"; CIRCLE 10,116,
1: DRAW 12,0: CIRCLE 22,116,1
9360 PAUSE 50: PRINT AT 8,1; PAP
ER 7; INK 0;"50": CIRCLE 10,100,
1: DRAW 25,0: CIRCLE 35,100,1
9370 PAUSE 50: PRINT AT 10,1; PA
PER 7; INK 0;"100": CIRCLE 10,84
,1: DRAW 50,0: CIRCLE 60,84,1
9380 PAUSE 50: PRINT AT 12,1; PA
PER 7; INK 0;"150": CIRCLE 10,68
,1: DRAW 75,0: CIRCLE 85,68,1
9390 PAUSE 50: PRINT AT 14,1; PA
PER 7; INK 0;"200": CIRCLE 10,52
,1: DRAW 100,0: CIRCLE 110,52,1
9400 PRINT AT 17,0;"YOU CAN USE
ANY STRENGTH"'" 1 TO 200";0; IN
VERSE 1;"PRESS ANY KEY TO CONTIN
UE"
9410 PAUSE 0
9420 CLS : PRINT AT 0,0;"STRENGT
H AND ANGLE OF SHOT"
9430 PRINT AT 2,0; PAPER 2; INK
7;"ANGLE"
9440 PAUSE 50; PLOT 119,96; DRAW
 40,0: PRINT AT 10,20;"0"
9450 PAUSE 50: PLOT 119,96: DRAW
 32,32: PRINT AT 5,19;"45"
9460 PAUSE 50: PLOT 119,96: DRAW
 0,40: PRINT AT 4,14;"90"
9470 PAUSE 50: PLOT 119,96: DRAW
 -32,32: PRINT AT 5,7;"135"
9480 PAUSE 50: PLOT 119,96: DRAW
 -40,0: PRINT AT 9,7;"180"
9490 PAUSE 50: PLOT 119,96: DRAW
 32,-32: PRINT AT 14,18;"-45"
9500 PAUSE 50: PLOT 119,96: DRAW
 0,-40: PRINT AT 15,13;"-90"
9510 PAUSE 50: PLOT 119,96: DRAW
 -32,-32: PRINT AT 14,9;"-135"
9520 PRINT AT 17,0;"YOU MAY USE
ANY ANGLE 0 TO 180"
9530 PAUSE 100
9540 PLOT 151,96: DRAW -64,0,PI;
 DRAW 4,4: DRAW -4,-4: DRAW -4,4
9550 PRINT AT 19,0;"OR 0 TO -179
"
9555 PAUSE 100
9560 PLOT 151,96: DRAW -64,0,-PI
: DRAW -4,-4: DRAW 4,4: DRAW 4,-
4
9570 PRINT  INVERSE 1;0;"PRESS
ANY KEY TO CONTINUE"
9580 PAUSE 0
9600 CLS : PRINT AT 0,0; INK 2;"
WARNING"
9610 PRINT AT 2,0;"EXTRA CAUTION
 MUST BE TAKEN IF  THE GREEN IS
OVER A HAZARD eg:"
9620 PRINT AT 6,14; PAPER 3;"
";AT 7,14; PAPER 3; INK 6;"▄";AT
 7,15; PAPER 3; INK 0;"o"; PAPER
 3; INK 6;"▙"
9630 PRINT AT 8,14; PAPER 3;"
"
9640 PRINT AT 10,0;"AS A MISSED
SHOT COULD RESULT INTHE LOSS OF
STROKES"
9650 PRINT AT 13,0;"NOTES"'"1:A
line will be drawn between  each
 shot until you land on the gree
n"
9660 PRINT AT 18,0;"2:If you fin
d the hole too smallat first you
 can widen it by    altering the
 No's in line 190"
9670 PRINT  INVERSE 1;0;" PRESS
 ANY KEY TO CONTINUE      "
9680 PAUSE 0
9690 CLS
9695 RETURN
9699 REM ** set up variables **
9700 LET k=0: LET u=0: LET a=0
9710 LET a=0: LET b=0
9720 LET p1=1
9730 LET z=0
9740 LET p=0: LET l=0
9750 DIM t(18)
9760 DIM i(18)
9770 DIM v(18)
9780 DIM q(11)
9790 DIM w(11)
9800 DIM f(11)
9810 DIM e(2)
9820 RETURN
9899 REM *** set up U.D.G's. ***
9900 FOR j=USR "a" TO USR "h"-1
9910 READ a: POKE j,a: NEXT j
9912 RETURN
9915 REM a=▄
9920 DATA 0,7,15,127,127,127,255
,255
9925 REM b=▙
9930 DATA 0,199,239,255,255,255,
255,255
9935 REM c=▙
9940 DATA 0,224,240,254,254,254,
255,255
9945 REM d=■
9950 DATA 126,124,120,60,124,124
,62,62
9955 REM e=▯
9960 DATA 34,254,34,34,34,254,34
,34
9965 REM f=▀
9970 DATA 0,126,126,126,126,64,6
4,64
9975 REM g=♥
9980 DATA 24,124,126,124,60,24,2
4,52
```

Sort At Input

by Tom Ithell

Sorting is the most written-about topic in software literature. Reams and reams have been written about chopping a few extra microseconds off a sort time.

When the data to be sorted is typed at a keyboard, the most obvious and frequently overlooked method is to sort at input. During the pause between pressing RETURN and the next data item, there's usually sufficient time to place the data item in a sorted array. The impressive aspect of this method of sorting is that a sorted output is immediately available after entering the last item.

The routines were written on a TRS-80 Model 1, although little modification is needed to run the routines in any dialect of Basic. Listing one is a sort of numbers into ascending order, listing two is a sort of strings into ascending order, and listings three and four show the changes needed to make the sort in descending order.

```
1 REM LISTING 1
10 REM NUMBER SORT ON INPUT
20 REM (C) T.A.ITHELL 1984
30 REM USEFUL FOR UP TO 200 NUMBERS
40 REM DELETE REM STATEMENTS FOR FASTEST OPERATION
100 CLS
109 REM SPECIFY READINGS
110 INPUT"STATE NUMBER OF ITEMS TO BE SORTED";NR
119 REM DIMENSION ARRAY
120 DIM ARRAY(NR+1)
129 REM INITIALISE ARRAY(0) WITH LARGE DUMMY NUMBER
130 ARRAY(0)=10000000000000000000
139 REM ZERO ARRAY
140 FORZ=1 TO NR+1
150 ARRAY(Z)=0
160 NEXTZ
169 REM NUMBER INPUT LOOP
170 FOR LOOP=1 TO NR
180 PRINTLOOP;:INPUT"STATE NUMBER";V
189 REM CHECK IF INPUT IS LESS THAN DATA ALREADY IN ARRAY
190 FOR CHECK=0 TO LOOP
200 IF V(=ARRAY(CHECK)THEN220
210 NEXT CHECK
218 REM MOVE ALL EXISTING SORTED NUMBERS FORWARD ONE ARRAY
219 REM ELEMENT TO CREATE SPACE FOR NEW NUMBER
220 FOR MOVE = LOOP TO CHECK STEP-1
230 ARRAY(MOVE+1)=ARRAY(MOVE)
240 NEXT MOVE
249 REM PUT NEW NUMBER INTO THE ARRAY
250 ARRAY(CHECK)=V
260 NEXT LOOP
269 REM PRINTOUT THE SORTED NUMBERS
270 FOR PR=0 TO NR-1
280 PRINT ARRAY(PR);" ";
290 NEXT


1 REM LISTING 2
10 REM STRING SORT ON INPUT
20 REM (C) T.A.ITHELL 1984
30 REM USEFUL FOR UPTO 100 STRING DATA ITEMS
40 REM DELETE REM STATEMENTS FOR FASTEST OPERATION
100 CLEAR2000:CLS
109 REM SPECIFY READINGS
110 INPUT"STATE NUMBER OF STRINGS TO BE SORTED";NR
119 REM DIMENSION ARRAY
120 DIM ARRAY$(NR+1)
129 REM INITIALISE ARRAY$(0) WITH LARGE DUMMY STRING
130 ARRAY$(0)="ZZZZZZZZZZZZZZZZZZZZ"
139 REM ZERO ARRAY
140 FORZ=1 TO NR+1
150 ARRAY$(Z)=""
160 NEXTZ
169 REM STRING INPUT LOOP
170 FOR LOOP=1 TO NR
180 PRINTLOOP;:INPUT"STATE STRING";V$
189 REM CHECK IF INPUT STRING IS LESS THAN DATA ALREADY IN ARRAY
190 FOR CHECK=0 TO LOOP
200 IF V$(=ARRAY$(CHECK)THEN220
210 NEXT CHECK
218 REM MOVE ALL EXISTING SORTED STRINGS FORWARD ONE ARRAY
219 REM ELEMENT TO CREATE SPACE FOR NEW STRING
220 FOR MOVE = LOOP TO CHECK STEP-1
230 ARRAY$(MOVE+1)=ARRAY$(MOVE)
240 NEXT MOVE
249 REM PUT NEW STRING INTO THE ARRAY
250 ARRAY$(CHECK)=V$
260 NEXT LOOP
269 REM PRINTOUT THE SORTED STRINGS
270 FOR PR=0 TO NR-1
280 PRINT ARRAY$(PR)
290 NEXT

1 REM LISTING 3
10 REM NUMBER SORT ON INPUT (DESCENDING ORDER)
!
DELETE LINES 129 AND 130
!
139 REM ZERO ARRAY
140 FORZ=0 TO NR+1
150 ARRAY(Z)=0
160 NEXTZ
!
189 REM CHECK IF INPUT IS GREATER THAN DATA ALREADY IN ARRAY
190 FOR CHECK=0 TO LOOP
200 IF V=)ARRAY(CHECK)THEN220
210 NEXT CHECK
1 REM LISTING 4
```

```
10 REM STRING SORT ON INPUT (DESCENDING ORDER)
!
DELETE LINES 129 AND 130
!
139 REM ZERO ARRAY
140 FORZ=0 TO NR+1
150 ARRAY$(Z)=""
160 NEXTZ
!
189 REM CHECK IF INPUT STRING IS GREATER THAN DATA ALREADY IN AR
RAY
190 FOR CHECK=0 TO LOOP
200 IF V$=)ARRAY$(CHECK)THEN220
210 NEXT CHECK
```

Jan Binders
March 1985 - p175

Commodore 64 Defkeys

by M Hibbet

With this program it's possible to define each of the eight function keys on the Commodore 64 to any string of text up to 60 characters in length. Its obvious use is to define the most commonly-used Basic commands and statements, such as PRINT, POKE, LIST, RUN, and so on. RETURN may be included at the end of the text so that direct commands will be executed immediately. Sixty characters gives plenty of scope to produce more complicated operations, as a number of statements can be linked together using semicolons.

The text for the keys may be defined in two ways: by a direct command, or as a line in Basic. The method of doing this is as follows:

1) By direct command —
n = text
where n is the function key number 1 to 8. To set function key 3 to the text 'PRINT' you type:
3 = PRINT
2) In a Basic line —
REM n= text

In both cases, if RETURN is required at the end of the text, then the last character before the ' ' should be a shifted R.

When a key has been defined, whenever the key is pressed its associated text is printed from the current cursor position.

To run the program, type it in and then RUN and SYS 49312. If, for any reason, you want to return the function keys to their normal operation, this can be done with SYS 49328.

Once the program has been run and loaded into memory, it's convenient to save it to tape as a machine code file. This is done as follows:
POKE 44,196:POKE 43,0
POKE 46,195:POKE 45,129
SAVE "DEFKEY MC"

It can be loaded back into memory with:
LOAD "DEFKEY MC",1,1

When loaded type:
NEW

The machine code must be loaded before any Basic program which uses it.

```
10 FOR A= 49152 TO 49340
20 READ B
30 POKE A,B
40 NEXT
50 FOR A= 49920 TO 50048
60 READ B
70 POKE A,B
80 NEXT
90 FOR A= 49408 TO 49919
100 POKE A,0
110 NEXT
1000 DATA160,0,185,14,192,153,115,0,200,
192,6,208,245,96,32,20,192
1010 DATA32,65,192,32,43,192,201,13,208,
15,32,65,192,32,43,192,141
1020 DATA72,192,32,73,192,32,65,192,96,1
65,122,141,62,192,165,123,141
1030 DATA63,192,238,62,192,208,3,238,63,
192,173,0,8,96,230,122,208
1040 DATA2,230,123,96,234,169,193,141,15
8,192,173,72,192,56,233,49,141
1050 DATA72,192,162,0,41,3,240,12,162,64
,74,240,7,162,192,106,48
1060 DATA2,162,128,142,157,192,173,72,19
```

```
2,201,4,48,3.238,158,192,162
1070 DATA0,32,65,192,32,65,192,32,65,192
.32,43,192,201,210,208,2
1080 DATA169,13,201,93.240,8,32,156,192,
232,224,63,208,232,169,0,32
1090 DATA156,192,96,157,0,193,96,32,0,19
2,120,169,5,141,20,3.169
1100 DATA195,141,21,3,88,96,120,169,49,1
41,20,3,169,234,141,21,3
1110 DATA88,96
1120 DATA6,0,2,4,0,8,165,197,205,4,195,2
08,3,76,114,195,201
1130 DATA3,16,8,169,0,141,4,195,76,114,1
95,201,7,16,244,141,4
1140 DATA195,56,233,3,170,189,0,195,24,1
09,141,2,72,162,0,41,3
1150 DATA240,12,162,64,74,240,7,162,192,
106,48,2,162,128,142,84,195
1160 DATA169,193,141,85,195,104,201,4,48
.3,238,85,195,160,0,185,0
1170 DATA193,201,0,240,24,201,13,240,24,
132,254,174,134,2,41,191,32
1180 DATA19,234,32,182,230,164,254,200,1
92,63,208,225,40,76,49,234,141
1190 DATA119,2,169,1,133,198,40,76,49,23
4
```

Space Drop

by A Clark

Be prepared to take on a veritable onslaught of alien ships. They may come at you only one at a time, but each attack is made with renewed vigour. You are in your own ship at ground level and can move back and forth taking pot-shots at the enemy space ship. It's kill or be killed — you must shoot down your adversary before it reaches you.

The title screen adds an original touch and demonstrates to good effect the Commodore 64's keyboard graphic capabilities. It doesn't use redefined characters — they are all accessible from the keyboard. A TV screen flicks through the various channels until it reaches what is on the Commodore 64 tonight.

After the title page you go straight into the game. Use a joystick in control port one to fire down a level one alien. A hit summons a level two alien to move into attack. And so on until the alien contingent overwhelms you and your level and score are displayed along with the highest level reached and the highest score.

There is no high-score table but this could easily be included between lines 640 and 699.

```
0 REM*** S#P*A#C*E##D#R#O#P ***
1 REM**** BY ANDY CLARKE 1984 ***
2 REM*******************************
3 PRINT"{CLEAR}":POKE53280,0:POKE53281,0
4 GOSUB330:FONS=2001:0205:FORT=0TO62
5 READA:POKES*64+T,A:NEXT:NEXT
6 FORT=0TO62:POKE206*64+T,0:NEXT
7 FORT=0TO62:POKE207*64+T,0:IFT=40RT=30R
T=60RT=9THENPOKE207*64+T,4
8 IFT=2ORT=5ORT=8ORT=11THENPOKE207*64+T,
32
9 NEXT:GOSUB100:HS=0:BL=0
10 FL=3:SC=0:HL=0
11 LE=0:PRINT"{CLEAR}":V=53248:GOSUB620:
GOSUB500
12 IFFL=0THEN650
13 POKE2040,200:POKE2041,201
14 POKE2042,207:POKEV,150:POKEV+1,230
15 GOSUB600:POKEV+41,1
16 POKEV+39,6:POKEV+40,15
20 POKEV+28,2:POKEV+38,10:POKEV+37,6
22 POKEV+21,3:POKEV+30,0:X1=150:W=3
30 JS=PEEK(56321)
32 IFJS=247THENX1=X1+10
34 IFJS=251THENX1=X1-10
36 IFX1=>255THENX1=255
38 IFX1=<30THENX1=30
40 IFJS=239ORJS=235ORJS=231THENGOSUB200
42 X2=X2+W:IFX2)=250ORX2(=30THENW=-W:Y2=
Y2+10
44 IFX2)255THENX2=255
46 IFX2(30THENX2=30
48 IFY2)=220THENFL=FL-1:GOSUB520:GOTO640
50 POKEV,X1:POKEV+2,X2:POKEV+3,Y2:GOTO30
100 PRINT"{CLEAR}":LF=54272:FORT=1234TO1
251
102 POKET,224:POKET+360,224:POKET+LF,9:P
OKET+360+LF,9:NEXT
104 FORT=1274TO1554STEP40:POKET,224:POKE
T+17,224
106 POKET+LF,9:POKET+17+LF,9:NEXT
108 FORT=1276TO1286:POKET,67:POKET+280,6
7:POKET+LF,14:POKET+280+LF,14:NEXT
110 FORT=1315TO1515STEP40:POKET,66:POKET
+12,66:POKET+LF,14:POKET+12+LF,14:NEXT
112 POKE1275,85:POKE1267,73:POKE1555,74:
POKE1567,75
114 POKE1275+LF,14:POKE1287+LF,14:POKE15
55+LF,14:POKE1567+LF,14
116 FORT=1579TO1449STEP40:POKET,87:POKET
+LF,7:NEXT
```

```
110 FORT=1468TO1490:POKET,61:POKET+40,61
:POKET+LF,15:POKET+40+LF,15:NEXT
120 PRINT"{YELLOW}{HOME}{DOWN}{DOWN}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}      {
c G}{c G}{c G}{s #}{s #}{s #}{s #}{s #}"
122 PRINT"{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}          {RVSON}{s -}{RVSOFF}
  "
124 PRINT"{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}          {s O}{s P}{s O}{s P}{s O}{
s P}    "
126 FORT=1716TO1729:POKET,224:POKET+LF,1
2:NEXT
128 FORT=1468TO1490:POKET,61:POKET+40,61
:POKET+LF,15:POKET+40+LF,15:NEXT
130 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}
{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOW
N}{DOWN}{DOWN}{DOWN}{DOWN}"{:S$="{RIGHT}
{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGH
T}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}"
132 PRINTS$;"{c 4}{RVSON}  {RVSOFF}
    {RVSON}  {RVSOFF}"
134 PRINTS$;"{RVSON} {RVSOFF}
 {RVSON} {RVSOFF} "
136 PRINTS$;"{RVSON} {RVSOFF}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RVSON}
 {RVSOFF} "
138 PRINTS$;"{RVSON} {RVSOFF}
 {RVSON} {RVSOFF} "
140 PRINTS$;"{LEFT}{LEFT}{RVSON}     {RV
SOFF}        {RVSON}     {RVSOFF}"
142 J$="{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}{RIGHT}":B$="{HOME}{DOWN}{DOWN}{DOW
N}{DOWN}{DOWN}{DOWN}{DOWN}":B=0
144 FORU=1TO7:B=B+1:ONBGOSUB302,304,306,
308,310,312,314
146 PRINTB$;:FORT=1TO6:PRINTJ$;A$:NEXT:G
OSUB300:NEXT
148 FORS=1TO30:PRINTB$;:FORT=1TO6
150 PRINTJ$;"{WHITE}{s M}{s M}{s N}{s M}
{s N}{s M}{s N}{s M}{s N}{s M}{s N}":NEX
T
152 PRINTB$;:FORT=1TO6
154 PRINTJ$;"{s M}{s N}{s M}{s N}{s M}{s
 N}{s M}{s N}{s M}{s N}":NEXT:NEXT
156 GOSUB316:PRINTB$;:FORT=1TO6:PRINTJ$;
A$:NEXT
158 GOSUB300:GOSUB300:GOSUB322:PRINTB$;:
FORT=1TO6:PRINTJ$;A$:NEXT
160 GOSUB300:PRINTB$;:FORT=1TO6:PRINTJ$;
'          ':NEXT
162 PRINTB$;J$;"{c 2}ION THE      "
164 PRINTJ$;"{c 8}COMMODORE "
166 PRINTJ$;"{YELLOW}SIXTY-{CYAN}FOUR"
168 PRINTJ$;"{PURPLE}HERE IS...":GOSUB30
0
170 PRINTB$;:FORT=1TO6:PRINTJ$;"{PURPLE}
A{WHITE}STAR DROP{PURPLE}A":NEXT:GOSUB3
00
172 PRINTB$;
173 PRINTJ$;"            "
174 PRINTJ$;"{c 3}    BY     "
175 PRINTJ$;"{WHITE}ANDY CLARKE"
176 PRINTJ$;"            "
177 PRINTJ$;" {c 3}{WHITE}C{c 3}) {YELL
OW}1984 "
178 PRINTJ$;"            ":GOSUB300
179 PRINTB$;
180 PRINTJ$;"{WHITE}{c A}{s #}{s #}{s #}
{s #}{s #}{s #}{s #}{s #}{c S}"
181 FORT=1TO4:PRINTJ$;"{s -}          {s
 -}":NEXT
182 PRINTJ$;"{c Z}{s #}{s #}{s #}{s #}{s
 #}{s #}{s #}{s #}{s #}{c X}":GOSUB324
183 PRINTB$;
184 PRINTJ$;"            "
185 PRINTJ$;" {c A}{s #}{s #}{s #}{s #}{
s #}{s #}{s #}{c S} "
186 PRINTJ$;" {s -}        {s -} "
187 PRINTJ$;" {s -}        {s -} "
188 PRINTJ$;" {c Z}{s #}{s #}{s #}{s #}{
s #}{s #}{s #}{c X} "
189 PRINTJ$;"            ":GOSUB324
190 PRINTB$;"{DOWN}"
191 PRINTJ$;"            "
192 PRINTJ$;"  {c A}{s #}{s #}{s #}{s #}
{s #}{c S}  "
193 PRINTJ$;"  {c Z}{s #}{s #}{s #}{s #}
{s #}{c X}  "
194 PRINTJ$;"            ":GOSUB324
195 PRINTB$;J$;"{DOWN}{DOWN}     {c P}
  "
196 PRINTJ$;"            ":GOSUB324
197 PRINTB$;:FORT=1TO6
198 PRINTJ$;"            "
199 NEXT:RETURN
200 X3=X1:Y3=PEEK(V+1):POKEV+30,0
202 POKEV+4,X3:POKEV+5,Y3:POKEV+2,X2:POK
EV+3,Y2
204 POKEV+21,7:Y3=Y3-10:X2=X2+W
206 IFX2>=250ORX2<=30THENW=-W:YZ=Y2+10:I
FY2>=220THENFL=FL-1:GOSUB520:GOTO640
207 IFX2>255THENX2=255
208 IFX2<30THENX2=30
209 IFY3<=20THENRETURN
210 IF(PEEK(V+30)AND6)=6THENGOSUB250:GOS
UB600:RETURN
212 GOTO202
250 B=201:SC=SC+100:GOSUB620
252 POKE2041,B:POKEV+21,3:GOSUB512:B=B+1
:IFB=207THENGOSUB500:RETURN
254 FORT=1TO100:NEXT
256 GOTO252
300 FORT=1TO2000:NEXT:RETURN
302 A$="{PURPLE}AND ON {YELLOW}BBC1":POK
E1329+LF,7
303 RETURN
304 A$="  {YELLOW}THE {WHITE}NEWS ":RETU
RN
306 A$="{c 6}AND ON {YELLOW}BBC2":POKE13
69+LF,7
307 POKE1329+LF,2:RETURN
308 A$="{WHITE}   ARENA   ":RETURN
310 A$="{PURPLE}AND ON {YELLOW}ITV ":POK
E1409+LF,7
311 POKE1369+LF,2:RETURN
312 A$="{WHITE}  MINDER   ":RETURN
314 A$="{c 6}AND ON {YELLOW}4   ":POKE14
69+LF,7
315 POKE1409+LF,2:RETURN
316 A$="{WHITE}BROOKSIDE?!"
318 FORT=1329TO1449STEP40:POKET,6
320 POKET+LF,7:NEXT:RETURN
322 A$="BUT NOW....":RETURN
324 FORT=1TO400:NEXT:RETURN
330 PRINT"{CLEAR}{HOME}{DOWN}{DOWN}{DOWN
}{DOWN}{DOWN}{DOWN}{DOWN}{RIGHT}{RIGHT}{
RIGHT}{YELLOW}LET'S SEE WHAT'S ON TV TON
IGHT.....":GOSUB300:RETURN
500 FORC=54272TO54296:POKEC,0:NEXT
502 VO=54296:AT=54277:WA=54276
504 SU=54278:HF=54273:LF=54272
506 POKEAT,32:POKESU,255
508 POKEHF,14,5:POKEWA,19
510 POKEVO,143:RETURN
512 POKEHF,B-200:RETURN
520 GOSUB500
522 FORT=100TO1STEP-1:POKEHF,T
524 POKEV+39,T:NEXT
526 GOSUB500:RETURN
600 X2=INT(250-50)*RND(1)+50:YZ=50
602 POKEV+3,Y2:POKEV+2,X2
604 B=206:W=ABS(W):W=W*2:LE=LE+1:GOSUB62
0
606 POKE2041,B:GOSUB512:B=B-1:IFB=200THE
NGOSUB500:RETURN
608 FORT=1TO50:NEXT
610 GOTO606
620 PRINT"{HOME}{RIGHT}{RIGHT}{RIGHT}{RI
GHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{
RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT
}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}{RIGHT}{c 3}SCORE:"
622 PRINT"{HOME}{DOWN}{RIGHT}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}
{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGH
T}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RI
GHT}{RIGHT}{RIGHT}{YELLOW}{SC
624 PRINT"{HOME}{DOWN}{DOWN}{RIGHT}{RIGH
T}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RI
GHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{
RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT
}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{c 3}LIVES:"
626 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{RIGHT
}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIG
HT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{R
IGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}
{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGH
T}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{YELLOW}"I
FL
628 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}
{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOW
N}{DOWN}{DOWN}{RIGHT}{RIGHT}{RIGHT}{RIGH
T}{WHITE}######{c 3}LEVEL "ILE;" ALIEN{WH
ITE}######"
630 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}
{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGH
T}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RI
GHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{
RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT
}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{RIGHT}{c 3
```

```
]BEST LEVEL:"
632 PRINT"[HOME][DOWN][DOWN][DOWN][DOWN]
[DOWN][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT
][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGH
T][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][R
IGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT]
[RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGH
T][YELLOW]"HL:RETURN
640 IFLE)HLTHENHL=LE
642 POKEV+21,3:GOTO11
650 POKEV+21,1:PRINT"[CLEAR]"
652 PRINT"[HOME][DOWN][DOWN][DOWN][DOWN]
[RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][WHIT
E]GAME OVER"
654 PRINT"[DOWN][DOWN][RIGHT][RIGHT][RIG
HT][RIGHT][RIGHT][YELLOW]SCORE[WHITE]"S
C
656 PRINT"[DOWN][RIGHT][RIGHT][RIGHT][R
IGHT][RIGHT][YELLOW]BEST LEVEL[WHITE]"HL
657 POKEV0,0:IFSC)HSTHENHS=SC
658 PRINT"[DOWN][RIGHT][RIGHT][RIGHT][R
IGHT][RIGHT][YELLOW]BEST SCORE[WHITE]"HS
659 IFHL)BLTHENBL=HL:PRINT"[DOWN][RIGHT]
[RIGHT][RIGHT][RIGHT][RIGHT]WELL DONE!!!
"
660 PRINT"[DOWN][RIGHT][RIGHT][RIGHT][RI
GHT][RIGHT][YELLOW]BEST EVER LEVEL[WHITE
]"BL
662 PRINT"[DOWN][DOWN][DOWN][RIGHT][RIGH
T][RIGHT][RIGHT][RIGHT][c 3]ANOTHER GO?"
664 PRINT"[DOWN][RIGHT][RIGHT][RIGHT][RI
GHT][RIGHT][c 6]MOVE STICK FOR [WHITE]NO
"
666 PRINT"[RIGHT][RIGHT][RIGHT][RIGHT][R
IGHT][c 6]PRESS FIRE FOR [WHITE]YES"
668 JS=PEEK(56321):IFJS=239THEN674
670 IFJS<>255THENSYS64738
672 GOTO668
674 FORT=1TO200:NEXT:PRINT"[DOWN][RIGHT]
[RIGHT][RIGHT][RIGHT][RIGHT][WHITE]VIEW
TITLES?"
676 PRINT"[DOWN][RIGHT][RIGHT][RIGHT][RI
GHT][RIGHT][c 6]MOVE STICK FOR [WHITE]NO
"
678 PRINT"[RIGHT][RIGHT][RIGHT][RIGHT][R
IGHT][c 6]PRESS FIRE FOR [WHITE]YES"
680 JS=PEEK(56321):IFJS=239THENPOKEV+21,
0:GOSUB330:GOSUB100:GOTO10
682 IFJS<>255THEN10
684 GOTO680
30000 REM******LAUNCHER
30001 DATA4,56,64,4,124,64,4
30002 DATA108,64,4,238,64,7,239
30003 DATA192,4,238,64,4,238,64
30004 DATA0,238,0,0,238,0,0
30005 DATA238,0,0,238,0,65,239
30006 DATA4,65,109,4,71,109,196
30007 DATA71,109,196,79,125,228,95
30008 DATA125,244,125,171,124,253,125
30009 DATA126,221,69,118,213,1,86
30010 REM******ALIEN #1
30011 DATA0,0,0,0,0,0,0
30012 DATA0,0,128,0,8,32,0
30013 DATA32,8,0,128,1,65,0
30014 DATA7,255,64,31,255,208,85
30015 DATA85,84,102,102,100,85,85
30016 DATA84,31,255,208,7,255,64
30017 DATA1,85,0,0,0,0,0
30018 DATA0,0,0,0,0,0,0
30019 DATA0,0,0,0,0,0,0
30020 REM******ALIEN #2
30021 DATA0,0,0,0,0,0,0
30022 DATA0,0,0,0,0,32,0
30023 DATA32,8,0,128,2,2,0
30024 DATA1,85,0,5,85,64,21
30025 DATA253,80,22,170,80,21,253
30026 DATA80,21,85,80,1,85,0
30027 DATA0,0,0,0,0,0,0
30028 DATA0,0,0,0,0,0,0
30029 DATA0,0,0,0,0,0,0
30030 REM******ALIEN #3
30031 DATA0,0,0,0,0,0,0
30032 DATA0,0,0,0,0,0,0
30033 DATA0,8,0,128,2,2,0
30034 DATA0,136,0,1,85,0,5
30035 DATA85,64,5,253,64,5,85
30036 DATA64,1,85,0,0,0,0
30037 DATA0,0,0,0,0,0,0
30038 DATA0,0,0,0,0,0,0
30039 DATA0,0,0,0,0,0,0
30040 REM******ALIEN #4
30041 DATA0,0,0,0,0,0,0
30042 DATA0,0,0,0,0,0,0
30043 DATA0,0,0,0,2,2,0
30044 DATA0,136,0,0,32,0,0
30045 DATA84,0,1,117,0,0,84
30046 DATA0,0,0,0,0,0,0
30047 DATA0,0,0,0,0,0,0
30048 DATA0,0,0,0,0,0,0
30049 DATA0,0,0,0,0,0,0
30050 REM******ALIEN #5
30051 DATA0,0,0,0,0,0,0
30052 DATA0,0,0,0,0,0,0
30053 DATA0,0,0,0,0,0,0
30054 DATA0,0,0,0,136,0,0
30055 DATA32,0,0,84,0,0,0
30056 DATA0,0,0,0,0,0,0
30057 DATA0,0,0,0,0,0,0
30058 DATA0,0,0,0,0,0,0
30059 DATA0,0,0,0,0,0,0
```

Rudiments of Raster Interrupts

by R Keeble

Commodore 64 graphics programming can exploit rasters — the rows of dots that make up a TV screen — to produce interrupts. In this way, the screen can be split in two, with a different graphics mode in each half. An example would be a high-resolution graph with explanatory notes underneath.

Because the picture on screen is redrawn around 60 times per second, interrupts must be handled by machine code routines.

There are four registers which concern us here:

1 Raster compare register at 53266 ($D012)
2 Raster compare register bit 8 at 53265 ($D011)
3 Interrupt enable register at 53274 ($D01A)
4 Interrupt status register at 53273 ($D019)

The raster compare register has two functions. If it is read, the exact location of the raster is obtained. If written to, an interrupt is forced when the raster reaches that position.

For an interrupt to occur, the Interrupt enable register must be set to a 1. Finally, when an interrupt occurs, the interrupt status register is affected. If caused by the raster, bit 0 is set to a 1.

Two listings are provided here, one in Basic and one in Assembly language. If using an assembler, lines 10-40 and 200-250 can be omitted from the Basic program.

When run, the program places multi-coloured blocks on the top half of the screen, with text underneath. This may not sound too exciting, but provides the rudiments of more advanced techniques as found in *The Hulk*.

The Basic program is self-explanatory, but I shall deal with the machine code in sections.

```
SEI
LDAIM    29
STA      788
LDAIM    192
STA      789
```

This first part relocates the address for interrupt handling routines. The address is stored in 788 (LSB) and 789 (MSB). When the 64 is first switched on, these registers contain the address 59953.

Raster blaster

If an interrupt occurs while this address is being changed, the computer would probably 'lock up'. For this reason, the routine starts with SEI — set interrupt disable.

```
LDA      53265
ANDIM      127
STA      53265
LDA      53274
ORAIM        1
STA      53274
```

Here, 'bit 8' of the raster compare is set to a 0, so all values fall within the range 0 to 255 (the screen is from 51 to 251 *ie* 25 rows). The interrupt enable register is set to ON.

```
CLI
RTS
```

Having changed the vectors and prepared for the new interrupt routine, interrupts can be enabled again (CLI). The program is exited with the RTS.

Now onto the new routine:

```
LDAIM      1
BIT    53273
BNE        3
JMP    59953
```

Interrupts can also be caused by sprite collisions and light pens, so this part of the program checks that the flag was set by the raster compare IRQ, using the BIT instruction. If the raster didn't cause the interrupt, the usual interrupt routine must be used. (This resides at 59953).

```
LDA    53266
CMPIM    252
BCS       21
```

Now it's certain the raster caused the interrupt, the next step is to determine its position on screen. If less than 252, the raster is in the text area, and carries on to the following set of instructions:

```
LDAIM    252
STA    53266
LDA    53270
AND IM   239
STA    53270
LDAIM      6
STA    53281
JMP    49237
```

A new raster compare value is placed into the register at 53266, and the multi-colour mode is set to OFF. The background will be blue.

```
LDAIM    126
STA    53266
LDA    53270
ORAIM     16
STA    53270
LDAIM      14
STA    53281
```

This does the opposite to the previous section, turning ON the multi-colour and setting a new interrupt for the middle of the screen. The background colour is switched to a more sombre grey.

Ready to go

The last section of code is the same as that found in the normal interrupt handling routine. It clears the raster IRQ flag by writing a 1 to it, and restores the Accumulator and X and Y registers to the values held before the interrupt occurred.

Control is returned to the program via the RTI instruction.

```
10 FOR N = 1 TO 96 : REM POKE MACHINE CODE
20 READ SPLIT : REM INTO MEMORY
30 POKE 49151+N,SPLIT : REM STARTING AT 49152
40 NEXT N
50 PRINT"{CLR}"
60 PRINT"A DEMONSTRATION OF SPLIT SCREEN GRAPHICS"
70 PRINT"{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}"
80 PRINT"A DEMONSTRATION OF SPLIT SCREEN GRAPHICS"
90 POKE 53282,1 : REM BACKGROUND COLOUR 2,WHITE
100 POKE 53283,2 : REM BACKGROUND COLOUR 3, RED
120 SYS49152 : REM SPLIT THE SCREEN
130 END
200 DATA 120,169,29,141,20,3,169,192,141,21,3,173,17,208,41,127
210 DATA 141,17,208,173,26,208,9,1,141,26,208,88,96,169,1,44
220 DATA 25,208,208,3,76,49,234,173,18,208,201,252,176,21,169,252
230 DATA 141,18,208,173,22,208,41,239,141,22,208,169,6,141,33,208
240 DATA 76,85,192,169,130,141,18,208,173,22,208,9,16,141,22,208
250 DATA 169,14,141,33,208,169,1,141,25,208,104,168,104,170,104,64
```

ADDRESS		MACHINE		ASSEMBLY CODE	
DECML	HEX	CODE		PROGRAM	
49152	C000	78		SEI	
49153	C001	A9 1D		LDAIM	29
49155	C003	8D 14 03		STA	788
49158	C006	A9 C0		LDAIM	192
49160	C008	8D 15 03		STA	789
49163	C00B	AD 11 D0		LDA	53265
49166	C00E	29 7F		ANDIM	127
49168	C010	8D 11 D0		STA	53265
49171	C013	AD 1A D0		LDA	53274
49174	C016	09 01		ORAIM	1
49176	C018	8D 1A D0		STA	53274
49179	C01B	58		CLI	
49180	C01C	60		RTS	
49181	C01D	A9 01		LDAIM	1
49183	C01F	2C 19 D0		BIT	53273
49186	C022	D0 03		BNE	3
49188	C024	4C 31 EA		JMP	59953
49191	C027	AD 12 D0		LDA	53266
49194	C02A	C9 FC		CMPIM	252
49196	C02C	B0 15		BCS	21

```
49198 C02E ] A9 FC       ]  LDAIM   252
49200 C030 ] 8D 12 D0    ]  STA   53266
49203 C033 ] AD 16 D0    ]  LDA   53270
49206 C036 ] 29 EF       ]  ANDIM   239
49208 C038 ] 8D 16 D0    ]  STA   53270
49211 C03B ] A9 06       ]  LDAIM     6
49213 C03D ] 8D 21 D0    ]  STA   53281
49216 C040 ] 4C 55 C0    ]  JMP   49237
49219 C043 ] A9 7E       ]  LDAIM   126
49221 C045 ] 8D 12 D0    ]  STA   53266
49224 C048 ] AD 16 D0    ]  LDA   53270
49227 C04B ] 09 10       ]  ORAIM    16
49229 C04D ] 8D 16 D0    ]  STA   53270
49232 C050 ] A9 0E       ]  LDAIM    14
49234 C052 ] 8D 21 D0    ]  STA   53281
49237 C055 ] A9 01       ]  LDAIM     1
49239 C057 ] 8D 19 D0    ]  STA   53273
49242 C05A ] 68          ]  PLA
49243 C05B ] A8          ]  TAY
49244 C05C ] 68          ]  PLA
49245 C05D ] AA          ]  TAX
49246 C05E ] 68          ]  PLA
49247 C05F ] 40          ]  RTI
@@@@@@@@@@@1@@@@@@@@@@@1@@@@@@@@@@@@@@
```

Sketcher

by P Leon

"Sketcher" was written for the unexpanded VZ-200. It allows you to draw in 4 colours, rubout, clear the screen, and get a hard copy of your artwork (if you have a suitable printer attached). There are instructions in the program. The program was written to use joysticks but if you do not have any or would like to use the keyboard, the changes you will need are at the end of the program listing. These are the keys you would use if you use the keyboard.

RUBOUT		DRAW	
W		U	
A	S	H	J
Z		N	

```
100 REM *************
110 REM *  SKETCHER  *
120 REM *BY PAUL LEON*
130 REM *AUGUST  1984*
140 REM *************
200 REM
220 GOTO 1000
300 MODE(1):X=64:Y=32:COLOR2,0
305 A=127:B=63
310 RESET(X,Y)
320 K$=INKEY$:I$=INKEY$
330 I%=VAL(I$)
340 IF I%>0ANDI%<5THEN COLORI%
345 GOSUB 3000
350 A%=INP(46)AND31
360 IFA%<>31,400
370 FORZ=1TO40:NEXT:SET(X,Y):FORZ=1TO40:
```

```
NEXT:GOTO310
400 IFA=30ANDY>0,Y=Y-1 'UP
410 IFA=29ANDY<B,Y=Y+1 'DOWN
420 IFA=27ANDX>0,X=X-1 'LEFT
430 IFA=23ANDX<A,X=X+1 'RIGHT
440 IFA=14ANDY>0,SET(X,Y):Y=Y-1
450 IFA=13ANDY<B,SET(X,Y):Y=Y+1
460 IFA=11ANDX>0,SET(X,Y):X=X-1
470 IFA=7ANDX<A,SET(X,Y):X=X+1
480 IFA=7ANDX<A,SET(X,Y):X=X+1
500 GOTO 310

1000 REM *** INSTRUCTIONS ***
1030 CLS
1060 PRINT@165,"INSTRUCTIONS (Y/N)"
1070 K$=INKEY$:A$=INKEY$
1080 IFA$="N",300ELSEIFA$="Y",1100
1090 GOTO 1070
1100 CLS:PRINT@6, *** INSTRUCTIONS ***"
1110 PRINT@65, USE THE RIGHT JOYSTICK"
1120 PRINT@129, TO DRAW HOLD THE FIRE BU
TTON"
1130 PRINT@161, DOWN AND PUSH THE JOYSTI
CK IN"
1140 PRINT@193, THE REQUIRED DIRECTION."
1150 PRINT@257, TO MOVE WITHOUT DRAWING
OR TO"
1160 PRINT@289, RUBOUT, JUST PUSH THE JO
YSTICK"
1170 PRINT@321, IN THE REQUIRED DIRECTIO
N."

1180 GOSUB 2000
1190 CLS:PRINT@8, *** COMMANDS ***"
1200 PRINT@65,"C - CLEARS SCREEN AND PLA
CES"
1210 PRINT@101,"CURSOR IN THE CENTRE."
1220 PRINT@161, E - WILL END THIS PROGRA
M."
1230 PRINT@225, P - WILL PRODUCE A COPY
OF"
1240 PRINT@261, THE SCREEN IF A SUITABLE

1250 PRINT@293, PRINTER IS ATTACHED."
1260 PRINT@325, E.G. SEIKOSHA GP-100/A"
1270 GOSUB 2000
```

```
1280 CLS:PRINT@8,"*** COLOURS ***"
1290 PRINT@65,"TO CHANGE COLOUR WHILE DR
AWING"
1300 PRINT@97," JUST PRESS 1, 2, 3, OR 4.
"
1310 PRINT@193,"1 = GREEN":PRINT@209,"2
= YELLOW" ;
1320 PRINT@225,"3 = BLUE":PRINT@241,"4 =
 RED"
1330 PRINT@321,"NOTE: COLOUR 1 (GREEN) I
S THE"
1340 PRINT@353,"SAME AS THE BACKGROUND C
OLOUR."
1380 GOSUB 2000
1390 GOTO 1000
2000 PRINT@449,"PRESS <C> TO CONTINUE"
2010 K$=INKEY$:A$=INKEY$
2020 IFA$<>"C",2010
2030 RETURN
3000 K$=INKEY$
3010 A$=INKEY$
3020 IFA$="" RETURN
3025 IF A$<>"P" AND A$<>"E" AND A$<>"C"
RETURN


3030 IFA$="P" COPY:RETURN
3040 IFA$="E" END
3050 IFA$="C" RUN300
3060 RETURN



CHANGES NEEDED TO USE THE KEYBOARD

350 A$=INKEY$:A$=INKEY$
360 IFA$<>"",400

400 IFA$="W"ANDY<0,Y=Y-1 'UP
410 IFA$="Z"ANDY<B,Y=Y+1 'DOWN
420 IFA$="A"ANDX>0,X=X-1 'LEFT
430 IFA$="S"ANDX<A,X=X+1 'RIGHT
440 IFA$="U"ANDY>0,SET(X,Y):Y=Y-1
450 IFA$="N"ANDY<B,SET(X,Y):Y=Y+1
460 IFA$="H"ANDX>0,SET(X,Y):X=X-1
470 IFA$="J"ANDX<A,SET(X,Y):X=X+1
```

BACK ISSUES

This Back Issues listing has been updated to include all of the available 1984 issues of APC. An order form is included at the end of the listing. Please allow up to four weeks for delivery.

Volume1 No 6, 1980
Benchtests: Commodore 8032, SuperBrain/Overview of chess machines and micro programs/Writing machine independent Basic programs/Printer review/Programs: Lunar Lander (TRS-80), PET Fighter Pilot, Apple Plotting, LPrint to Print utility (TRS-80), ZX80 Breakout Graph (TRS-80).

Volume 2 No 3, 1981
Checkout: Sinclair ZX81/APC-80: Recovering lost programs, JUMP command (allows a GOTO "numeric expression")/Building a Bigboard/Keystroke reduction for EDTASM users/Sanders Printer reviewed/Profile of BS Microcomp/CP/M explained by Rodnay Zaks/The rapid bubble sort for the Apple/Encryption for any Microsoft Basic/An imagined 6502 "Dream Machine" specs/Vectors explained on the Challenger 1P/Programs: TRS-80 flashing cursor and non-destructive backspace, Treasure Hunt (PET).

Volume 2 No 4, 1981
Benchtest: VIC-20, Tandy TRS-80 III/TRS-80 Monitor software compared/Computer Games: Backgammon on micros/Tree access routines explained/Gateways to Logic, Part 8: Peripherals/How Computers Communicate, Part 1: What is I/O?/Profile Gary Blom of the Computer Company/Part 1 of 2: Defining program specification needs/6502 Assembler in Basic/Wordpower wordprocessor program for the PET/Programs: PET Arithmetic Test, Apple Mondrian.

Volume 3 No1, 1982
Benchtest: Tandy TRS-80 Color/Checkouts: Hitachi Peach, Sharp's Microtranslator, BBC Proton/Profile of Rodnay Zaks/Sorting alphanumeric codes from disk to disk/Computer games:GO-MOKU on micros/Generating Patterns with a computer, Part 3: The parallel interface/Review of Forth Language/A neat way to describe programs quickly and logically/Speech Synthesis for the TRS-80s, System 80s, Part 1/Cassette utility for System 80 on Eprom/An easy route to shape tables for the Apple/Rubik Cube Simulation for the Apple/How to implement "Turtle" graphics on an Apple/Programs: Get Simulation (Apple), Bug Bug (TRS-80), Cryptography (Microsoft Basic).

Volume 3 No 2, 1982
Checkout: Apple III/Fitting a smooth curve to complex data plots/Speech synthesis for TRS-80s, System 80s, Part 2/"Bridge" on micros/Relocating assembly language programs/Binary sort explained/Programmable rhythm generator project for PET/Large number calculations on micros/Basic interpreters explained/Checkout: ZX81 printer/APC-80 overview and debounce routine/Storing arrays on tape/Frames of Reference, Part 1: A DP manager's guide to micros/How Computers Communicate, Part 4: The IEEE interface/Overview of micro-computer databases/Programs: TRS-80 Alien Seabattle.

Volume 3 No 3, 1982
Benchtest: Hewlett Packard HP-125/WP Benchtest: Scripsit 2.0/Checkout: Dick Smith Votrax Type 'N Talk. The Australian Beginning/Videotext overview/Frames of Reference, Part 2: Hardware and Software Suppliers/Profile: Jim Warren of the West Coast Computer Faire/How Computers Communicate Part 5: The BCD Interface/Installing hi-res on the TRS-80/Bridge playing program reviewed/Programs: Galacti-Cube (3D Maze in fairly "standard" Basic), PET Fantasy, ZX80 Labyrinth, PET Juggle.

Volume 3 No 4, 1982
Benchtests: Osborne 01, Micro Bee/APC-80: Command mode syntax error recovery/How Computers Communicate Part 6: The RS232 interface/80 x 24 display controller project/Preview of the Commodore 64/Atari 400 games reviewed/Profile: Adam Osborne/ANS Basic's features/Solving the hidden surface problem in 3D graphics/Frames of Reference, Part 3: Micros in mainframe company/Hewlett Packard's networking capability/Programs: TRS-80 Reaction Timing, ZX81 Graphplot, PET Cheese, Superboard Spin-Fighter, TRS-80 Extra.

Volume 3 No 5, 1982
Benchtests: Texas Instruments TI 99/4A, Xerox 820/Database Benchtest: FMS-80/TRS-80 Model I games reviewed/Frames of Reference, Part 4: Software standards/How Computers Communicate, Part 7: Interrupts in micro systems/How to use 3D graphics/Equation solving program/80 x 24 display controller project, Part 2/"Logo" Overview/Printer survey/Casio's calculator printer/Programs: TRS-80 Double Precision Maths and Trig, Apple 3D Maze,Atari Sums for Kids, Apple Air Flight.

Volume 3 No 6, 1982
Benchtests: Sinclair ZX Spectrum, Sirius I/Database Benchtest: dBase II/7th West Coast (micro-computer Faire)/Checkout: F-10 Daisywheel printer, Arfon Expandaboard/How Computers Communicate, Part 8: Direct memory access/Frames of Reference, Part 5: Buying micro hardware in a DP department/Self learning program/80 x 24 display controller project, Part 3 (end)/How to get more on Apple disks/Lisp — an artificial intelligence language/VIC-20 games reviewed/Implementing CP/M system calls from Microsoft Basic/APC Subset (first on new monthly column for assembler language routines)/Programs: TRS-80 Invader, PET Mini-animate, VIC-20 Trailblazer, ZX81 Book Index, Weebug Monitor (TRS-80), VIC-20 Large Characters.

Volume 3 No 7, 1982
Benchtests: Sharp MZ80B, Monroe OC 8820/Checkout: Sharp PC1500, The Micro-Professor/Apple II games reviewed/APC-80: Various PEEKs and POKEs explained/Reversing images on computer screens/Frames of Reference, Part 6: Putting your micro to work/How Computers Communicate, Part 9: Character codes/Educational arcade-type game/Programs: ZX81 Hypocycloids, TRS-80 Truth, PET Doc, TRS-80 Screen Dump, PET Boxes, Atari Earth.

Volume 3, No 9, 1982
Benchtest: ICL Personal Computer/Checkout: E40/CP/M data compression utility/ Daisywriter printer, HP 41C & 120 calculators/BBC micro graphics capability/Best of APC's cartoons/How to use Benchmarks/Logo Program (Microsoft Basic) Computer generated textures/RS232 overview, Part 2/Memory-saving utility for Apple/How Computers Communicate, Part 11: Interrupts and buffers/Programs: Sytem 80 Extended Basic, Apple Trees, ZX81 Alphabetising, PET File Companion, PET German Game.

Volume 3 No 10, 1982
Benchtests: Hewlett Packard HP-86, National Panasonic JB3000/Checkout: Sharp PC-1211/UCSD p-System overview, Part 3 (end)/How to implement 3D graphics on a micro/CP/M-86 vs MS-DOS: Relative merits of these 16-bit operating systems discussed/Designing your own database/Monitor for TRS-80/System 80/File searching method/"Laws of Form" — a novel form of logic/How Computers Communicate, Part 12 (end)/Benchmarking high level languages/Programs: TRS-80 Cardshuffler, PET Knockout, PET Trains.

Volume 3 No 11, 1982
Benchtests: Hewlett Packard HP75C, Kaypro II, DEC Rainbow/Programs for the HP41C and Casio fx702p/Algebra checking program/More on MS-DOS vs CP/M-86/Predictions in the micro industry/Clock/calendar card for the Apple II, Part 1/Benchmarks summary/Programs: Apple II Piano Computer, Moon Module (Apple II, correction in Vol 4 No 1), Wallis (Atari, correction in Vol 3 No 12).

Volume 4 No 2, 1983
Benchtests: Sharp PC1251/Database Benchtest: Hi Data/Micros as best friends/A major boost to the standards of 'user friendliness'/Computing can be a health hazard/'Expert Systems' — part two: appraisal of 'intelligent' computers/Networks: Part 1/The Logo Turtle checked-out/Getting the most from the BBC's graphics/Are home computers just a passing fad?/The Prestige vs The human micro chess/Programs: Apple Character Plotter, System Tape Copier (TRS-80/System 80).

Volume 4 No 6, 1983
Benchtest: Texas Instruments' Professional/Checkouts: Comx 35 home computer, NEC's Spinwriter daisywheel printer/Multi-Tool Word wordprocessor from Microsoft/Occam Occult: futuristic new language/The world of creative cross-figures/MicroBee games reviewed/Are micros a good idea?/Programs: Construction Worker (System 80, TRS-80), Chicken Little (Micro-Bee), PET Zombies, Spectrum Blaster, Commodore 64 Sprite editor.

Volume 4 No. 8, 1983
Benchtests: Apple Lisa, DOT/Checkouts: Osborne Executive, Epson FX-80 printer/Consumer Electronics Show Report/Will the Computer be the next dominant species on Earth/Milton Bradley's chess computer that moves its own pieces/Choosing suitable disks for your computer/Cryptography on a micro/Warnier Orr structured programming, Part 1/How to use the six function keys on the PC1500/Programs: ZX81 Least Squares, System 80 Loading tapes from an external cassette player, TRS-80/System 80 Adventure program, Apple II Pascal menu generation.

Volume 4 No. 9, 1983
Benchtests: Sord M5/Checkout: Tandy Model 100, Lisawrite/Screenplay: TI 99/4A games/

BACK ISSUES

Steve Wozniak returns to Apple/Choosing a home micro/Warnier Orr programming, Part 2/Graph plotting and curve fitting on the BBC Computer/Bemoaning the mechanical teller/Programs: VIC-20 Snake line, ZX81 Surround, Apple II Screenplay, PET Histogram.

Volume 4 No. 10, 1983
Benchtests: Archives PC/Home Computer Survey — 15 micros selling for less than $1000 checked out by Steve Withers in an exhaustive market survey/Checkout: Simons Basic, T/Maker III — office tool for the IBM PC, Digital Research Personal Basic/Computerising Your Business — a light and practical guide/Beginners Guide to Basic Program Conversion/Clever trick with TI Sprites/Cocktail program/Warnier Orr programming, Part III/How portable is portable/Programs: Atari No-Trons, TRS-80/System 80 Multi-Maths, Apple Text Maker, VIC 20 Spider.

Volume 4 No. 11, 1983
Benchtest: Apricot/Checkouts: Atari 600XL, Ashton Tate's Financial Planner, Condor database, Atari Writer/Which Spreadsheet? PerfectCalc/Profiles: Clive Sinclair, Nolan Bushnell/Set up your own computer learning centre/Basic Converter Chart/Warnier Orr Programming Part 4: Techniques (end)/Programs: PET Wave Simulation, Apple II Aplist, Microsoft Basic Calendars, TI99/4A Breakout, Commodore Testing Your Fingers, Apple Dotter Puzzle, VIC-20 Starship, Commodore Maths Test.

Volume 4 No. 12, 1983
Benchtest: TANDY MC-10/Checkout: Executive 816, Lotus 1-2-3, VisiOn, Gemini 15X Printer/Computerising Your Business: Part 2, Setting up/Sort Trees for beginners/Printing big on an Epson printer/Bulletin boards/Programs: VIC-20 Robotank, VZ-200 Missile Command, New 'Bee Screen, MicroBee Grabble Grab, Apple French Test Card, TRS-80 Road Rally.

Volume 5 No. 1, 1984
Benchtest: NEC PC-8201A/Checkouts: Coleco Adam, Kaypro 10, Atari Paint, Desq/Micro music — how it's done: Part 1/"Check Digits" — methods of ensuring correct data entry/Building models using surfaces, not lines/Column sort algorithm/Graphics on Tandy's Co Co/Spectrum listing photofit/Locking Apple Listings/Programs: Commodore 64 Fast Sprites, IBM PC Sheepdog Trials, VIC 20 Variable List/Spectrum Lower CLS, Commodore 64 Monitor, Oric City Defense, MicroBee Tunes.

Volume 5 No. 2, 1984
Benchtest: Workstar, Commodore 720/Checkouts: Visiwall, Sord's Falc, 64 Vizawrite, Brainstorm/DIY Apple Interface/TRS-80 Disassembler/Benchmark summary to-date/Basic Program Conversion, Part 2 (Part 1 in Vol.4 No. 11)/BBC Music, Part 1/Could speech synthesisers do long term damage to the language?/Programs: TRS-80 Pascal Procedures, PET Maths Maze, BBC Logic Tree, VIC 20 Grid Bike, 64 Heli-bomber, 64 Battlestar Fighter, Apple Bridge Builder.

Volume 5 No. 3, 1984
Benchtests: IBM PC Junior, Sharp MZ-700/Checkouts: Androbot's Topo, Homeword word processor, TK/Solver, Educational Games Basic Program Conversion, Part 3: Apple II graphics/Atari memory (for patterns of colour and sound) tester/Teach Yourself Assembler, Part 1/BBC Music, Part 2/View, of the future from the author of VisiCalc/Give your program cassettes a spoken index/Programs: Apple Stargo, PET Areas, Spectrum Jackpot, Atari Split-screen, TRS-80 Sound Synthesiser, 3D 'Bee, 64 Sprite Designer.

Volume 5 No. 4, 1984
Benchtests: Macintosh, Spectravideo/Checkouts: IBM Portable PC, Unix, Visiword Plus, Spectravideo/Teach Yourself Assembler, Part 2/Basic Program Conversion, Part 4, TRS-80 and Apple II graphics/Sharp PC1500 game scoring listing/Interview: Bill Gates of Microsoft/Microchess: 4th World Chess Championship results/Inside Atari's research laboratory/Programs: (Microsoft Basic) Inlay Cards, BBC Splash!, VIC 20 Invaders, Commodore 64 Reversi, VZ-200 Moon Lander, ('64) Gary the Guitar.

Volume 5 No. 5, 1984
Benchtests: Hewlett Packard 150 Touch Screen, Dick Smith Challenger, Canon X-07/Checkouts: Revelation, Concurrent CP/M, StarBurst and StarIndex, Sendata modem, Commodore SFD 1001 disk drive, Brother EP44 personal typewriter/Basic Program Conversion, Part 5: Atari/Compaction techniques, examples in Commodore Basic/Teach Yourself Assembler, Part 3/Text vs Graphics adventures/Operating Systems, Part 1/Microchess: Superstar vs Constellation/Programs: 64 Plane Attack, Commodore Wordsquare, Atari Flash Simulator, Atari Pseudo-Dos, Sord M5 Charpatt, VIC 20 Ape King, MicroBee Hires Editor, Apple II Osteraids, 'Bee Label Printer.

Volume 5 No. 6, 1984
Benchtest: Sharp PC5000/Checkouts: Codewriter, Microsoft Word, Dick Smith Cat, Apple ProDos, Knowledgeman, Autocad/Play Battleships on two Commodore computers/The History of the Keyboard/Teach Yourself Assembler, Part 4/Artificial Intelligence: a report from Japan/Basic Program Conversion, Part 6: Spectrum/Spectrum "wide screen" word processing/Software Copyright: the debate/The dangers of reviewing software/Programs: TRS-80 Compiler, TRS-80 Braille Writer, VIC 20 Deathwall, Basic-86 Marvin, PET 3D O's & X's, Five W 'Bee.

Volume 5 No. 7, 1984
Benchtest: Epson PX-8/Checkouts: Memotech, Framework, HP Ink Jet Printer, Expert-Ease, Apple's Instant Artist/Teach Yourself Assembler, Part 5/Operating Systems, Part 2/Designing and selling programs, Part 1/Calling routines available in CP/M/The story behind MSX/Basic Program Conversion, Part 7: BBC/Programs: '64 Balloon, Atari Function Keys, BBC Seeted, MicroBee Slalom, VZ-200 Blockout, '64 Split Screen Graphics, VIC 20 Monster Hunt.

Volume 5 No. 8, 1984
Benchtest: Sinclair QL/Checkouts: Perfect Link, Friday!, Knowledgeman (Part 2), PlanStat, Commodore 64 Flight Simulator, Constellation, Pick/Modem protocols: XModem/Exploring WordStar/Input and Output on the Atari/$25,000 competition: Brun's Constant/Teach Yourself Assembler, Part 6, Designing and selling programs, Part 2/Teach Yourself Lisp, Part 1/Detente between DP departments and standalone users — the Information Centre/Programs: VIC Hatchery, BBC RAM Editor, VIC 20 Life Game, Commodore 64 Connect-Four (note correction to this program in Bludners Vol 5 No. 10, 1984), VZ-200 Database, TRS-80 Color Grafx Editor, Atari Basic System Reset.

Volume 5 No. 9, 1984
Benchtests: Hewlett Packard 110/Checkouts: Framework vs Symphony, overview: Portable Computers, Jane vs Appleworks, Pick/Profile: Wayne Wilson/Teach Yourself Lisp, Part 2/Logic of assembly language, written in convertible Basic/Teach Yourself Assembler, Part 7/Braindump: Defence of the Gotogoto Bird *(this is a really excellent one page article — Ed)*/Microchess: Cray Blitz vs David Levy/Programs: '64 Defuse, BBC Mindwaves, VIC 20 Gothic and Greek, '64 Brackets (an updated version appears on page 76 of Vol 5 No. 11, 1984), Spectrum File, VIC Star Scramble (note: a correction to this program appears in the Bludners section of Vol 5 No. 10, 1984).

Volume 5 No. 10, 1984
Benchtests: Commodore Plus/4, Osborne Encore/Checkouts: Model 100 disk drive and video interface, Open Access, GSX from Digital Research, Netcomm modem, Is this education software any good: opinion/DIY robotics for the BBC/Combining video and PC output on the one screen/Sorting useful-sized files without a disk/Bubble memory has it been worth the wait/Teach Yourself Lisp, Part 3/Pirate Bulletin Boards/DIY PC-video connection/How to write great software, Part 1/Programs: Atari Autorun, Commodore 64 Basic Assembler, Apple II Menu, BBC Equation Solver, Commodore Honeypot, Atari Snake, Spectrum Voyager, VZ-200 Mini calc Spreadsheet (improved in Bludners Vol 5 No. 12, 1984), IBM PC Microcomputer Graphics, Animated '64, Spectrum Graphics and sound.

Volume 5 No. 11, 1984
Benchtest: Apricot F1/Checkouts: Olivetti M24, Sperry PC, ITT Xtra, Commodore 16, AAP's microwave news service/The demise of the philosophy of the scholar: opinion/Artificial Intelligence: mind over matter/DIY Micro Music Circuit (to plug into a parallel port)/Computer Musicians/Teach Yourself Lisp, Part 4/Compilers: How they work and how to buy the best/Improving Commodore 64 programming skills/How to write great software, Part 2/Molecular electronics/Programs: Commodore 64 Superfile, Commodore 64 Mouse Master, '64 Sprite Editor, BBC graphics compiler/interpreter, Spectrum Crib Player, VZ-200 MON-200, Duelling VICs.

Volume 5 No. 12, 1984
Benchtests: IBM PC AT, Sony's MSX machine/Checkouts: Digital Research GEM, TI Speech Command, dBase III, Sunol network/Natural language processing/An introduction to the 68000 processor/Running your own bulletin board/Teach Yourself Lisp, Part 5/DIY Speech Synthesiser/How to write great software, Part III/Upgrade VIC 20 programs to the '64/Programs: Spectravideo Spectra-draw, '64 Hi-res Plot, TRS080 Automatic Cassette Indexer, Tandy Color/Dragon 32 Brimstone Part One, Spectrum Life, DayFinder (written in Lisp), Commodore 64 Gremlin's Garden.

BACK ISSUES ORDER FORM

Please supply the following back issues:

Vol. 1 No.	☐ 6					
Vol. 2 No.	☐ 3	☐ 4				
Vol. 3 No.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	☐ 7	☐ 9	☐ 10	☐ 11		
Vol. 4 No.	☐ 1	☐ 2	☐ 6/7	☐ 8	☐ 9	☐ 10
	☐ 11	☐ 12				
Vol. 5 No.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	☐ 7	☐ 8	☐ 9	☐ 10	☐ 11	☐ 12

All volumes not listed are no longer available.
Please check carefully and use block letters when ordering.

Any one issue $4.50; any two issues $8.70; any three issues $12.70; any four issues $16.40; further issues $3.50 each. Prices include post and packing.
Cheque or P.O. payable to *Australian Personal Computer*, 77 Glenhuntly Road, Elwood, Victoria 3184. Please allow up to four weeks for delivery.

Please charge my Bankcard. Bankcard No .....

Expiry Date ..... Signature .....

Name .....

Address .....

..... Postcode .....

NEWCOMERS START HERE

This is our unique quick-reference guide, reprinted every month, to help our readers pick their way through the most important pieces of (necessary) jargon found in APC. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. In the words of *The Hitch-hiker's Guide to the Galaxy*: Don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed.' This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *APC*.

For those completely new to computing, let's start with the question: What is a microcomputer? We can think of a micro as: a general-purpose device in contrast to a typewriter, which can only be used for typing; a calculator, for performing calculations; a filing cabinet, for filing information, to name just a few of its functions. A micro can do all these things and more.

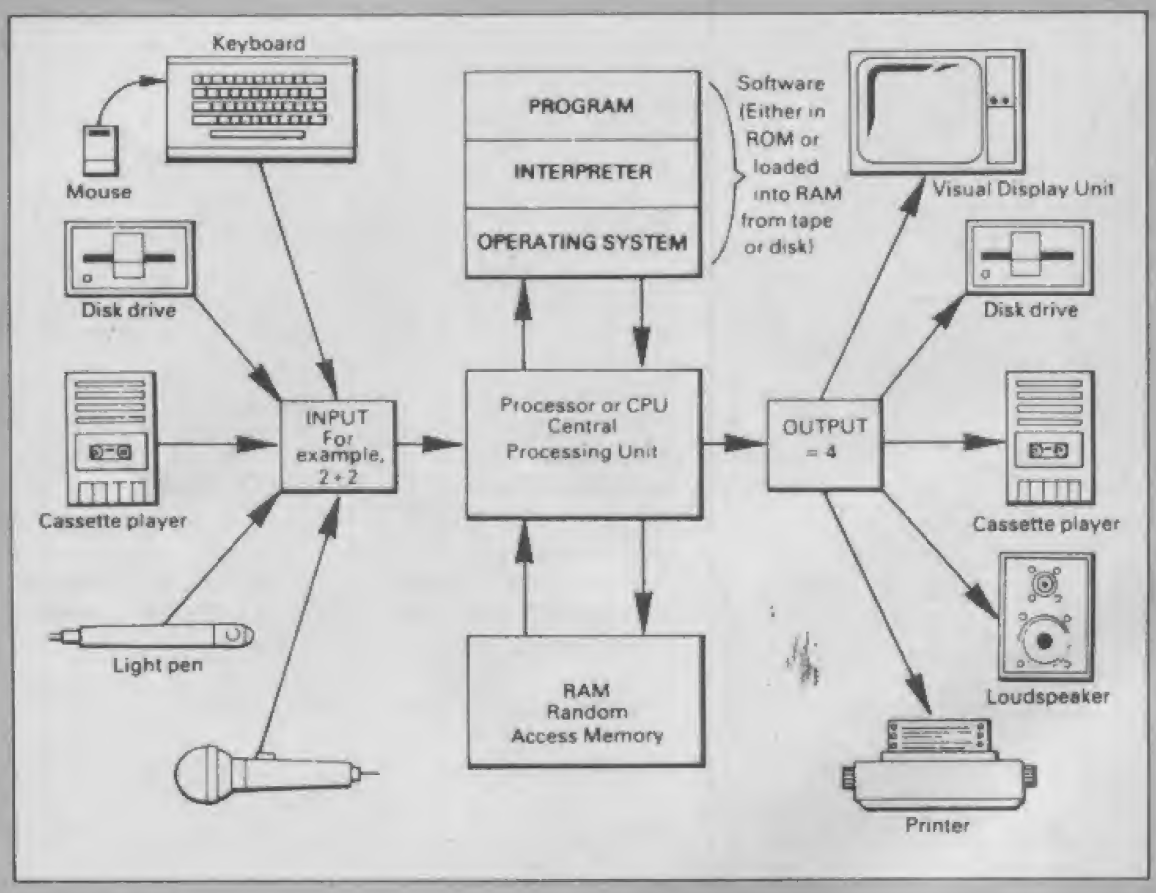
If it's to be of any use, a general-purpose device needs some way of knowing what to do. We do this by giving the computer a set of logical instructions called a *program*. The general term for computer programs is *software*. Every other part of a microcomputer system is known as *hardware*: 'If you can touch it, it's hardware.'

Programming

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a *code* known as a *computer language*. There are literally hundreds of different languages around, the most popular of these being *Basic*. Basic' is an acronym of *B*eginners' *A*ll-purpose *S*ymbolic *I*nstruction *C*ode. Although originally intended as a simple introductory language, Basic is now a powerful and widely used language in its own right.

Other languages you're likely to come across in *APC* are *Forth*, *Pascal*, *Logo*, *C* and *Comal* to name but a few. These are known as *high level* languages because they approach the sophistication of a human language. You'll also see references in *APC* to the *low level* languages, *assembly language* and *machine code*. We'll look at these in a moment.

The heart of a micro, the workhorse, is the *processor* or Central Processing Unit *(CPU)*. The processor usually consists of a single silicon chip. As with computer languages, there are a number of different types of processor available, *Z80*, *6502*, *6800* and *8088* being just a handful (literally) of the types in common use. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.



A schematic view of a microcomputer system

As it's electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by *binary* (base two) notation, the two binary digits (known as *'bits'*) being 0 and 1. It's possible to program computers in binary notation, otherwise known as machine code (or machine language) programming.

Machine code is called a low level language because it operates at a level close to that 'understood' by the processor. Languages like Basic are known as high level languages because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.

Between high level languages and machine code is a low level language known as assembly language or, colloquially, *assembler*. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

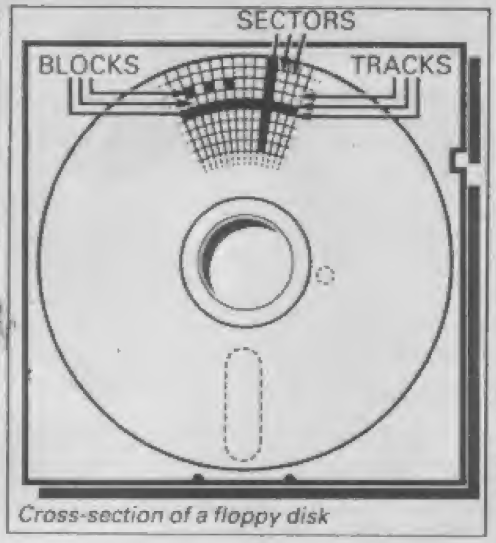
Since everything has to be converted into binary form before the processor can make sense of it, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the American Standard Code for Information Interchange, *ASCII*. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

A program written in a high level language must be converted into binary before the processor can carry out its instructions. We could of course do this manually, but since this is exactly the sort of tedious job computers were designed to do for us, it makes much more sense to write a program to do it.

There are two types of program to do this translation for us.

The first of these is a *compiler* which translates our whole program permanently into machine code. When we *compile* a program, the original high level language version is called the *source code* while the compiled copy is called the *object code*. Compiled programs are fast to run but hard to edit. If we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code. For this reason there is a second translation program: an *interpreter*. An interpreter waits until we actually *run* (use) the program, then translates one line at a time into machine code — leaving the program in its original high level language. This makes it slower to run than a compiled program, but easier to edit.

There are two unusual Basic words you're likely to come across: *POKE* and *PEEK*. When you program in a high level language, you are normally unable to choose in which part of the machine's memory the processor will store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the POKE command, however, you can 'poke' a value directly into a desired memory address. 'POKE 10000,56', for example, puts the value 56 into memory location 10000. PEEK allows you to examine the content of a particular memory address. If you were to follow the above poke with 'PEEK (10000)', the computer would respond by displaying the value 56. POKEing and PEEKing is normally done to increase program speed, but may also allow us to do things which could not be done through Basic.



Cross-section of a floppy disk

Memory

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of *memory*. There are two types of memory: *Read Only Memory (ROM)* and the badly named *Random Access Memory (RAM)*. ROM is so-called because the processor can 'read' (get things out of) its contents, but is unable to 'write to' (put things in) it.

ROM is used to store *firmware*, the name given to software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from ROM in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and *data* (information). The second important difference is that RAM needs a constant power supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

There is a type of RAM, known as *CMOS RAM*, which requires only a tiny amount of power to retain its contents. This is found in portable computers like the Tandy 100. It is usually powered by small ni-cad batteries so that programs and data are retained even when the main power is switched off. At present, CMOS RAM is extremely expensive and is not likely to be used in desktop machines for a little while yet. (CMOS stands for Complementary Metal Oxide Semiconductor).

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8 bit binary number. 8 bits make one *byte* and 1024 bytes make one *Kilobyte* or *1k*. 32k, for example, means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 . . . 1024 being the nearest binary multiple to 1000.

While we're on the subject of bits, you'll often see computers and their processors described in terms of their *bit power: 8-bit, 16-bit, 32: 16-bit* and so on. This is a means of describing how large a binary number the processor can handle in one chunk. A binary number, incidentally, is known — confusingly — as a *word*. An 8-bit processor, for example, can handle 8-bit words, that is, up to 11111111 (255 in decimal). Anything larger than this has to be broken down into manageable chunks before it can be processed.

A 16-bit machine can handle bigger chunks of data at a time. This means it can handle ('*address*') larger amounts of memory at one time. This is why most 8-bit machines have a maximum of 64k RAM while 16-bit micros usually have 128k upwards.

As 16-bit processors can handle larger words than an 8-bit machine, they ought to be twice as fast. In practice, however, there is a little more to it than that. While it may take a 16-bit machine half as long to work out that 2+2=4, the actual processing is only part of the story.

The result of the calculation has to be placed into the appropriate memory location, passed to the screen or whatever is required. The transfers to and from the processor are often made in 8-bit form; this is why you'll hear people arguing that certain processors are not 'true' 16-bit. If the problem has to be handed to the processor in 8-bit form, turned into 16-bit, calculated and then the result turned back into 8-bit for transfer elsewhere, there may be little or no saving in time over an 8-bit system.

The other factor affecting speed is that the actual processing may form only a small part of the overall operation. A word processor, for example, spends most of its time passing files to and from disk and waiting for the user to type the next character. The processing itself consumes very little time. And if you look at the Benchmarks summary (*APC*, February 1984, pp 59-60), you'll see some 8-bit machines beating their 16-bit rivals — even in processor-bound operations like the *APC* Benchmarks.

Returning to the subject of RAM for a moment, a word of warning: Don't rush out with your new-found understanding to buy the machine offering you the most RAM for your money. Quite aside from the fact that the amount of RAM is by no means the only consideration when buying a micro (no matter how much manufacturers may stress it), different machines use differing amounts of RAM for things like graphics. Always check how much RAM is actually available to the user for program storage. Machines which proudly proclaim '64k' may well leave you with less than half of this in which to store Basic programs and data.

Back-up storage

There are numerous forms of *permanent* or *back up storage*, but by far the most common are *floppy disk*, *floppy tape* and *cassette*.

Floppy disks or diskettes are circular pieces of thin plastic coated with a magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a *disk drive*. Disk drives comprise a high-speed motor to rotate the disk and a

read/write head to record and 'play back' programs and data.

The disk is divided into concentric rings called *tracks* (similar to the tracks on an LP) which are in turn divided into small *blocks* by spoke-like divisions called *sectors*.

There are two methods for dividing the disk into sectors. One method is called *hard sectoring*, where holes punched in the disk mark the sectors, and the other is *soft sectoring* where the sectors are marked magnetically. The reason that disks from one machine can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers have apparently begun to acknowledge that this situation can't go on forever, and they are working on making their disks compatible.

Since the computer needs some way of organising the disk, we have a program called a *Disk Operating System (DOS)*, usually known simply as the *Operating System (OS)*. The operating system does all the 'housekeeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available, each with its own advantages and disadvantages. The three most popular OSs are *CP/M* (Control Program for Micros), *MS-DOS* (MicroSoft Disk Operating System) and *PC-DOS* (Personal Computer Disk Operating System). MS-DOS and PC-DOS, incidentally, are all but identical.

Disks can support what are known as *random access files*. That is, you can randomly choose a point in a file and the drive head will move directly to that point. You can then edit the file, and only the blocks affected will be rewritten. The rest of the file remains unchanged.

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and adequate for games, for example.

Cassettes can support only *serial access files*. That is, whenever a file is to be edited, the whole file must be written back to the tape. This makes certain applications — word processing being a prime example — extremely tedious.

Floppy tape drives are a compromise between speed and cost. They use a small continuous loop tape which, like a disk, is divided into blocks. Floppy tape drives rely on serial access files, but by rotating the tape at high speed and using the block markers, they can simulate random access files.

Another type of disk you'll see referred to is the *hard disk*. This is an extremely efficient method of storing large amounts of data. Hard disk capacity generally starts at around 10 *Mbytes* (10 million bytes) and rises to . . . well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

Input/output

Since computers need some way of communicating with the outside world, we need *input* and *output* devices. Input and output devices include all manner of things from hard disk units to light pens, but the minimum requirement for most applications is a typewriter-style *keyboard* for input and a TV-like *Visual Display Unit* for output. The Visual Display Unit is variously referred to as a *VDU*, *Cathode Ray Tube (CRT)* and monitor.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, and so on, may all be built into a single unit or they may be separate, connected by cables.

Take this paragraph slowly and it will make sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — *parallel* or *serial*. Parallel *input/output (I/O)* requires a number of parallel wires. Each wire carries one bit, so with eight wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). Serial I/O, in contrast, uses a single wire to transmit a series of bits one at a time (that's why it's called serial), with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different *interfaces*. An interface is simply a piece of circuitry used to connect two or more devices. The most common standard serial interface is the *RS232* (or *V24*) while the Centronics standard is popular for parallel interfaces.

Networks

When two computers want to communicate with each other over a distance, there are again two ways of doing it (nothing is ever clear-cut in the world of micros — you'll get used to it). Both methods use the public phone network. The first is known as an *acoustic coupler*. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. The acoustic coupler is convenient in that you can unplug it from one computer and plug it into another one in a matter of seconds. They are generally slow, however, and prone to interference.

The alternative method is to use a *modem*. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from Telecom.

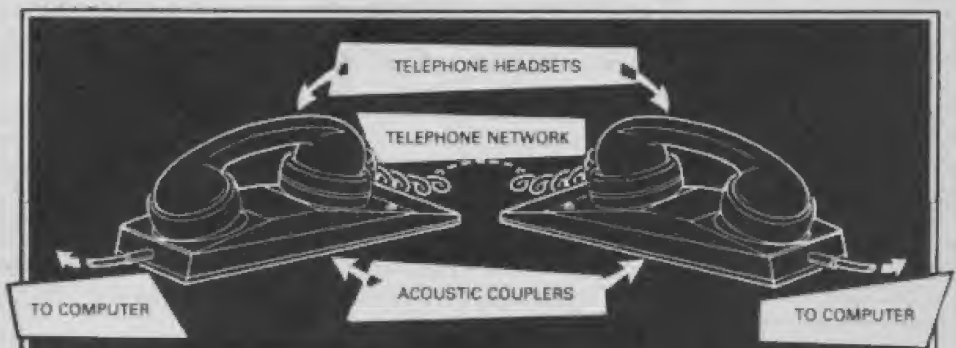
A term you'll hear used in connection with acoustic couplers and modems is *baud rate*. The baud rate is a measure of the speed at which a device can transmit and receive data. You can safely think of the baud rate as being bits-per-second, though the accurate definition is a little more complex. Therefore, a 300-baud modem can transmit/receive data at the rate of 300 bits (about 50 characters) per second.

A 1200/75 modem means that it receives at 1200 baud but transmits at 75. Most modems are 1200/75 and acoustic couplers 300/300. By way of comparison, saving programs to cassette is normally done at between 300 and 1500 baud.

Finally, communications between computers is either *full* or *half duplex*. Full duplex is when the machine receiving the data echoes it back to the machine transmitting it and says 'This is what I think you said — is that right?'. If it's wrong, the section will be transmitted again. Half duplex is where no checking is made. If you're ever unsure of which to use, start with full duplex. If everything you type appears on your display twice, then you should switch to half duplex.

Database

A database allows you to store, process and report on structured information. Most of the cheaper packages are based on a traditional card index where each card about an individual, order or item of stock is stored in a single record and a group of like records is stored in a file (corresponding to the index card box). Sophisticated packages can relate several files together, so that you can process groups of dissimilar but related records.

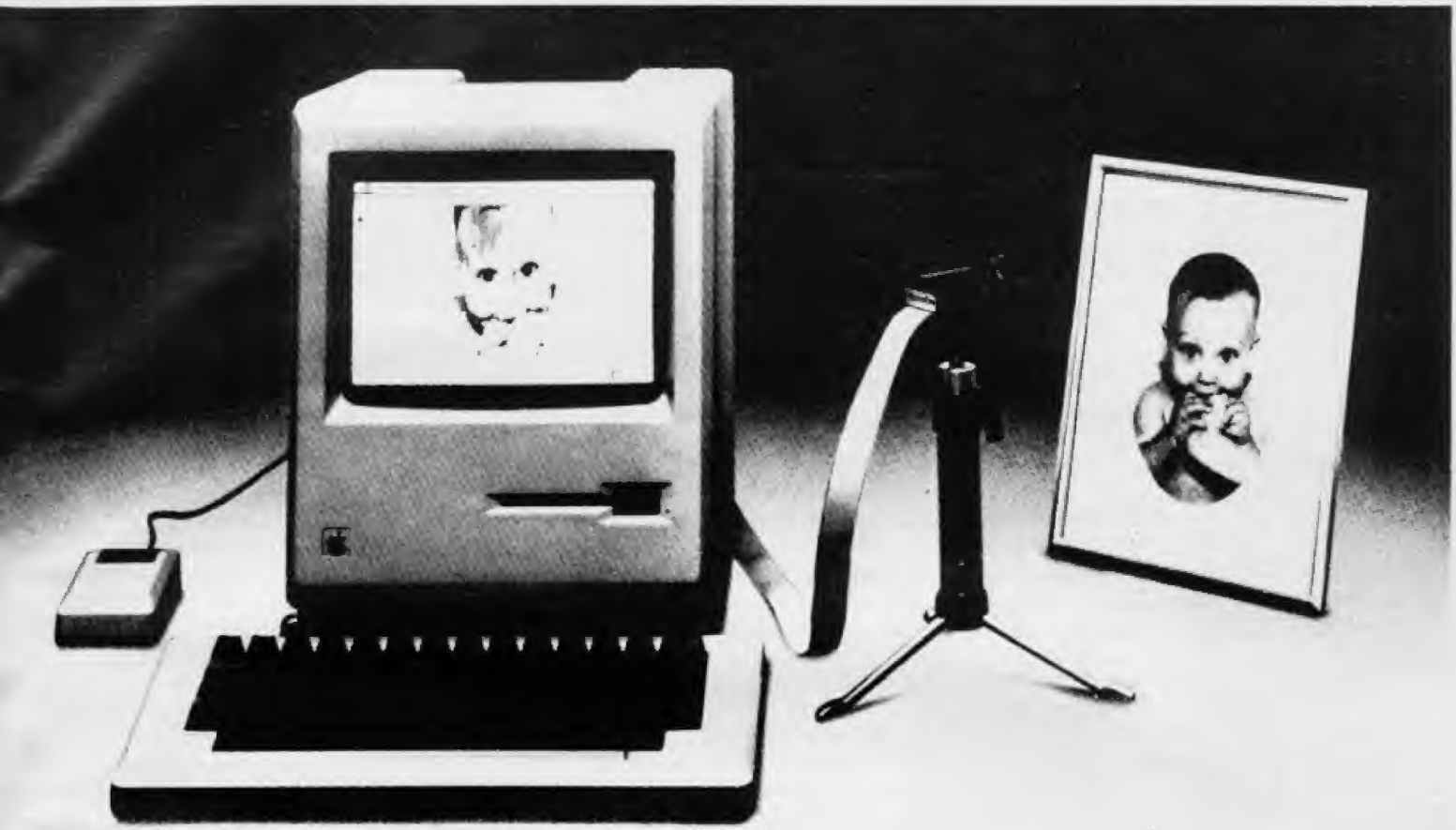


Computer-to-computer communications using acoustic couplers.

Spreadsheet

Spreadsheet software is useful to anyone who regularly uses a calculator. The VDU acts like a 'window' on a large sheet of numbers — neatly laid out in rows and columns, occasionally interspersed with text headings. The user is able to shift the window to the point of interest and so enter text. The rest of the calculation is displayed immediately with automatic recalculations throughout.

START A NEW LIFE



. . . for your computer

With a piece of hardware that'll keep you awake at night . . . finding more applications for this exciting new visual tool which puts visuals onto your computer screen.

Combine the Micron Eye camera/digitiser with Apple's Macintosh and Macpaint and then unleash your imagination!

Micron Eye models are also available for IBM PC, Apple 2, Commodore 64 and Tandy TRS 80 Colour Computer.

$795 at all good computer shops.

Software Source Pty Ltd

Return this coupon for more information on the Micron Eye & your local Software Source dealer list.

Name .....

Address .....

Postcode .....

Software Source Pty. Ltd.
P.O. Box 311
Bondi Junction 2022
Phone: (02) 389 6388

APC/0185

NETWORK NEWS

Peter Tootill and Steve Withers keep you up to date on the bulletin board world.

Bibliographic databases (again)

A couple of months ago we discussed bibliographic databases. While they're in a different league to bulletin boards, they are of interest to people in many professional and business areas.

We recently received a copy of the Directory of Australian Databases compiled by the Australian Database Development Association. Of the 67 publicly available databases listed, 26 are bibliographic covering areas like art, agriculture, business, road transport, and educational research. Systems still in the planning stage (at the time the directory was compiled) show a trend to full text rather than bibliographies.

The cost of using databases varies considerably but an average hourly charge of just over $31 is quoted. Charges are often based on what you do as well as how long you take doing it, so it can pay to find an experienced user to help you with your first searches.

An interesting aspect to the directory is that it gives the reader the names of the organisations producing databases. While some are well known (like government departments and big media companies), there are some surprises like the Australian Speleological Federation and the Trichoptera Working Group!

The directory is available from ADDA, PO Box 53, Hawthorn, Victoria 3122. The price is $35 (or $20 if you are an ADDA member).

PC Connection IBBS

(Once again we have a 'guest contributor' — this time it's Lloyd Borrett, operator of the PC Connection IBBS in Melbourne. Lloyd also provided a list of bulletin boards that included a couple we hadn't heard of before, plus some information to flesh out the bare phone numbers published last month.)

'Right, you've been told that members of MELB-PC now have access to a Bulletin Board System, well now I'll fill you in on it. The system is my personal IBM PC (with add-ons) at home, which has been made available as a bulletin board system whenever I'm not using it (which seems to be most of the time).

The BBS program was written by Gene Plantz (US) and I've made many changes to add new features, support Australian conditions, and fix one or two problems. Initial problems have been solved and the system is now going strong. It's already taken over 800 calls.

At present the board is open to all members of the community with the required hardware and software. MELB-PC was donated a Sendata 2000 modem by Electro-Medical Engineering, and that has become the group's contribution to the system. The phone line is provided by PC Connection Australia. There are no plans to close the system to users of systems which are not IBM and compatible. However, almost all of the resources available on the system are directed to IBM and compatible users.

Most bulletin boards, including mine, will let you in the first time you call. All you have to do is connect your computer to the telephone through the modem, dial the board number, and then answer some simple questions. Once you've gained access to the bulletin board you'll see a menu. This is a display of things you can do, and the code letters or numbers you have to enter to do them.

If you can have the terminal session saved to a disk file then do so. Alternatively, make sure it goes to the printer. You should then go hunting through the system, trying the various options, and displaying the help files. Then you can sit down later and study it. The system is designed to be easy for the newcomer to use, but this makes it a bit verbose.

Once some time has been spent learning the options, you can switch to EXPERT mode and move around the system a lot faster.

Let's consider the message system. The bulletin board has "public" and "private" messages. Public messages can be read by anyone, while "private" messages are flagged to be seen by just one other person. One word of caution. There is no such thing as a really private message. Any message you leave can be read by the system operator, usually referred to as the SYSOP (that's me). *(I know one operator who hates being called SYSOP — SW.)*

To get a Quick one line summary of the messages on the system use the "Q" command. This displays the message description. For more information, including the date entered, and who entered it, use the "S" (Summary) command. You can then use the "R" (Retrieve) command to look at specific messages.

Why not read a few? Then get back to the message section menu, and use the "B" (Bulletin) command. There are a number of "System Bulletins" prepared by the SYSOP. On my system they allow you to see lists of US and Australian bulletin boards, other user groups, and details about MELB-PC.

Once back to the message section menu you can select the "F" (File Transfer) command. Now you probably want to list the files that are available for downloading. But hold on a moment. The initial directory setting is ALL. Thus all files would be listed, and that could take a while. Use the "C" (Change Directory) command to select the type of files you would like to hunt out. Then use the "L" (List) command.

Take your time and have a good look around the system.

The bulletin board is fun to use, and a great way to meet people with the same interests. Running your own bulletin board gives you the same advantages, with the added fun of changing the program to run exactly the way you'd like a board to work. If your computer is sitting around twiddling its diodes half of the day or night, why not give it a taste of social life with a bulletin board of its very own?'

Communications junkies

Just as the spread of cheap personal computers threw up a crop of 'terminal junkies' (people who spend hours on end using a computer just for the sake of it), the proliferation of bulletin boards and other dial-up systems has spawned a new phenomenon — 'communications junkies'. These people feel they have to download as much software from remote systems as they possibly can, regardless of whether they are really interested in the programs. Really bad cases go to the extreme of downloading software that's completely incompatible with their systems (like the MicroBee owner who transferred a machine code program for the Commodore 64!)

This kind of behaviour is really antisocial. Most of the systems listed in Network News are understandably popular, and it can be hard to get through to them at peak times. If you get people tying up systems for hours on end the problem is made worse. On top of that,

AVTEK MULTI MODEM

Down the street or across the world. MultiModem speaks the language.

- ★ 300 baud full duplex, 1200 baud half duplex or 600 baud half duplex answer or originate
- ★ CCITT and Bell standards
- ★ Plugs straight in (hardwired phone)
- ★ Superior VLSI chip performance works reliably with -4dBM signal with S N ratio of 6dB Error rate on this level is 10^{-5}
- ★ Telecom Approval C84/37/1135

Inc. phone, only **$399**

MINI MODEM

- ★ 300 baud full duplex
- ★ Answer originate
- ★ Plugs straight in (hardwired phone)
- ★ Superior VLSI chip performance (identical to Multi Modem)
- ★ Telecom Approval (C84/37/1173)

Incl. phone only **$199**

VERBATIM DISKS

"Lowest" price possible for "Highest" quality.

	1-9	10+	100+
MD525-01	3.95	2.75	2.50
MD550-01	4.50	3.95	3.75

IBM COMPATIBLE COMPUTER

$2,150

Including tax!

COMPUTER PAPER

Top quality at a very affordable price. Blank 11x9 ½", 2,000 sheet, quality 60gsm bond paper.

Cat. C21001 **$29.50**

RITRON (ZETA) DATASETTE

For data loading and saving, this Micron Datasette suits most home computers and features tape counter, monitor function for audio verification and slide volume control for output level.

Cat. C14900 **$29.95**

PRINTERS GALORE

★ NEW ★ NEW ★

MB100S

The next generation of "80" type printers. 100 CPS, internal buffer expandable to 4K, Greek as well as italics. The print quality is the same as its forerunner. Square pins and film ribbon make it unbeatable.

1-4 **$325** 5+ **$299**

ENP1091

The latest addition to our range. Has a near letter quality mode 120 CPS. Down loadable character set. Graphics, Italics, emphasized etc.

Was $500 Now $420

Juki printer

Professional daisy wheel printer 18 CPS full incremental mode Diablo 630 emulation. Large range of daisy wheels. 8K internal buffer available.

Was $950 Now $790

Star Gemini 10

120 CPS logic seeking. Italics, graphics and down loadable characters sets. Friction and tractor. 9 x 9 matrix. Hi res graphics. Low cost typewriter ribbon.

Was $430 Now $360

Star Gemini 15

120 CPS logic seeking. Italics, graphics and down loadable characters sets. Friction and tractor. 9 x 9 matrix. Hi res graphics. Low cost typewriter ribbon.

Was $899 Now $729

Star Radix 15

Excellent fast printer. 200 CPS eats up the pages. With an amazing 16K internal buffer you won't waste any time. Has near letter quality mode, graphics and font variation.

$1,395

MONITOR MADNESS

COLOUR IS HERE IN A BIG WAY!!

PHOENIX V

Available late November. Order now for Xmas!

Pal. Suits Apple, Commodore even your V.C.R!

- ★ Pal and R.G.B.
- ★ Normal Res.
- ★ 13" CRT Dot Pitch 0.65mm
- ★ Horiz. Resol. 320 TV Lines
- ★ Vert. Resol. 560 TV Lines
- ★ Display Characters 1000 Ch. (40 x 25)
- ★ 16 Colours (Pal)
- ★ Green Text Display

Cat. X14522 **$449**

PHOENIX IV

Suits 'IBM' R.G.B. input

Cat. X14520 **$690**

RITRON 1

Our most popular model in a steel cabinet to minimise R.F.I. interference. Prices include tax. Make sure you get in early.

1-4	5-9	10+
Cat. X14500 (Green)		
$139	$135	$129
Cat. X14500 (Amber)		
$139	$135	$129

RITRON II

Swivel base monitor in stylish case.

1-9	10+
Cat. X14506 Green	
$169	$159
Cat. X14508 Amber	
$169	$159

RITRON III

Great resolution, swivel base. Amber only. Prices include tax.

	1-4	5+
Cat. X14510	$169	$159

SWIVEL BASE

Makes life easier, normally $29.50

Cat. D11100 **$22.50**

DISK STORAGE BOXES

25's or 50's

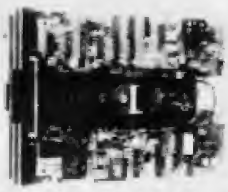
Efficient and practical! Protects your disks from being damaged or lost. Solves all those hassles of finding "that" disk.

Cat. C16025 25 Disk Box **$29.50**

Cat. C16050 50 Disk Box **$49.50**

INCREASE YOUR MEMORY

	1-9	10+
4116	1.80	1.70
4164	4.95	4.75
2716	6.25	5.95
2732	6.25	5.95
2764	8.25	7.95
27128	27.00	25.00
6116	6.95	6.75



MITSUBISHI DISK DRIVES

M2896-63

Slimline 8" Disk Drive. Double sided Density. No AC Power required. 3ms track to track. 1.6 Mbytes unformatted, 77 track side. 10^{-10} bit soft error rate.

Cat. C11916 **$630**

Case & Power Supply to Suit

Cat. X11022 **$109**

M2894

Standard size 8" drive. Double

Cat. C11914 **$630**

Case & Power Supply to Suit

Cat. X11011 **$79**

M4854

Slimline 5¼" disk drive. Double sided, double density, 96 track/inch, 9621 bit/inch, 1.6 Mbyte unformatted, 3ms track to track access, 77 track/side.

Cat. 11904 **$350**

Case & Power Supply to suit.

Cat. X11011 **$79**

M4853

Slimline 5¼" disk drive. Double sided, double density, 1 Mbyte unformatted, 3ms track to track, 80 track/side, 5922 bits/inch.

Cat. C11903 **$260**

M4851

Slimline 5¼" disk drive. Double sided, double density 500K unformatted, 40 track/side. Steel band drive system.

Cat. C11901 **$225**

Case & Power Supply to suit.

Cat. X11011 **$79**

M4855

Slimline 5¼" disk drive, double sided, double density, 96 track/inch. 2.0 Mbytes unformatted.

Cat. C11905 **$385**

MF353

3½" Standard size disk drive. Double sided, double density, 1 Mbyte unformatted.

Cat. C11923 **$265**

MF351

3½" Standard size disk drive. Single sided, double density.

Cat. C11921 **$225**

Rod Irving Electronics

425 HIGH STREET, NORTHCOTE VICTORIA. Ph:(03)489 8866 489 8131

48-50 A'BECKETT STREET, MELBOURNE VICTORIA. PH:(03)347 9251

Mail Order and correspondance: P.O. Box 235 NORTHCOTE 3070

Call in at either 2 of our conveniently located stores: 48-50 A'Beckett St., Melbourne 425 High St., Northcote. Or take advantage of our Mail Order Department. Write to:

MAIL ORDER CENTRE
ROD IRVING ELECTRONICS
P.O. BOX 235
NORTHCOTE 3070

or phone ...

MAIL ORDER HOT LINE

481 1436

welcome here

POSTAGE RATES

$1-$9.99	$1.50
$10-$24.99	$2.00
$25-$49.99	$3.00
$50-$99.99	$3.50
$100-$199	$5.00
$200-$499	$7.50
$500 plus	$10.00

Comet road freight is extra.

Certified Post for orders over $100 included "free"! Registered Post for orders over $200 included "free"! Account orders from schools Govt. Depts., Public Cos., gratefully accepted. Min. order of $20. (or a min. $5 accounting fee will apply.) Comet Road Freight, Airmail etc. are extra.

much of the attraction of BBSs comes from the variety of users. So, if the label 'communications junkie' fits you, think about your fellow users next time you log in.

Overseas News

In England a new bulletin board has started with an unusual specialty. Called "Clinical Notes Online", it runs TBBS software and is operated by ICRS–Elsevier, a publisher. If you have medical interests, it might be worth spending a few dollars on an ISD call (0011 44 254 60339, 24 hours).

A new type of BBS is appearing in the US, this is the networked bulletin board system. Once you have dialled one, you can transfer your call to another by a normal menu selection. An example is the "Mindstorm Network", which can be accessed on 0011 1 812 235 0908. We believe it is a 24 hour system.

Another new American system is called CLEO (Computer Listing of Employment Opportunities), which lists job vacancies all over the US and some other countries. There are access numbers in several cities — the Los Angeles number is 0011 1 213 618 8800.

System Listings

Once again we would like to thank all those who have taken the trouble to write to us with information about BBSs and other systems. Your help in keeping our lists up to date is greatly appreciated.

While we are grateful for all information, it would be useful if correspondents could indicate if they have personal knowledge of the system(s) concerned, or if they are simply passing on information from another source. The reason for this is that we were recently given two different numbers for the same system — one was correct, the other out of date.

We don't want to discourage anyone from writing to us, but it would make life a lot easier if you said something like "I last used this system on December 13th" or "I found this number in a list on the XYZ BBS on November 29th".

Australian systems

Micro Design Lab RCPM

Telephone: (02) 663 0150. System Operator: Stephen Jolly. Hours: 5pm–7am weekdays. 24 hours weekends.

MI Computer Club BBS

Telephone: (02) 662 1686. System Operator: Evan McHugh. Program downloading. Hours: 24 hours daily.

Sydney Public Access RCPM

Telephone: (02) 808 3536. System Operators: Barrie Hall and David Simpson. Membership required. Hours: 24 hours daily.

Prophet RBBS

Telephone: (02) 628 7030. Operator: Larry Lewis. Hours: 24 hours daily.

TISHUG BBS

Members only. Write to TISHUG, PO Box 149, Pennant Hills, NSW 2120 for information.

AUGABBS

Telephone: (02) 451 6575. System Operators: Mathew Barnes and Andrew Riley. Hours: 24 hours daily.

AUSBOARD

Telephone: (02) 955 377. System Operator: Daniel Moran. Hours: 24 hours daily.

CLUB-80 RTRS

Telephone: (02) 332 2494. System Operator: Michael Cooper for Sydtrug. Hours: 24 hours daily.

OMEN I

Telephone: (02) 498 2495. System Operator: Ted Romer. Hours: 4.30pm–9am weekdays, 24 hours weekends.

ORACLE

Telephone: (02) 960 3641. System Operator: Rowan Evans. Hours: Midnight–8am weekdays, Midnight–6am weekends.

PARIS RADIO

Telephone: (02) 344 9511. Hours: 24 hours daily.

Dick Smith Electronics RIBM

Telephone: (02) 887 2276. System Operator: Ian Lindquist. Program downloading. 24 hours daily.

Sorcerer Users Group RCPM

Telephone: (02) 387 4439. System Operator: John Woolner. Hours 6pm–8am weekdays, 24 hours weekends. Ring back system.

Ausborne Users Group RCPM

Telephone: (02) 568 2791. System Operator: Milton McGlynn-Worthington. Hours: 24 hours daily.

Newcastle Microcomputer Club RCPM

Telephone: (049) 68 5385. System Operator: Tony Nicholson. Hours: 5pm–8.30am weekdays, 24 hours weekends.

Canberra RBBS

Telephone: (062) 88 8318. Hours: 24 hours daily.

MICOM RCPM CBBS

Telephone: (03) 762 5088. System Operator: Peter Jetson. Hours: 24 hours daily.

Sorcerer Computer Users Association CBBS

Telephone: (03) 434 3529. System Operator: David Woodberry. Program downloading for SCUA members. Hours: 24 hours daily.

Melbourne PC Connection IBBS

Telephone: (03) 528 3750. System Operator: Lloyd Borrett. IBM PC program downloading. Hours: 24 hours daily.

Telebraille

Telephone: (03) 755 1341. (Austpac ?237520000). Operator: Jim Eadie. Hours: 24 hours daily.

OMEN IV

Telephone: (03) 846 4034. System Operator: Philip Westh. Hours: 24 hours daily.

HiSoft IBBS

Telephone: (03) 799 2001. System Operator: Richard Tolhurst. IBM PC program downloading. Hours: 24 hours daily.

Computers Galore IBBS

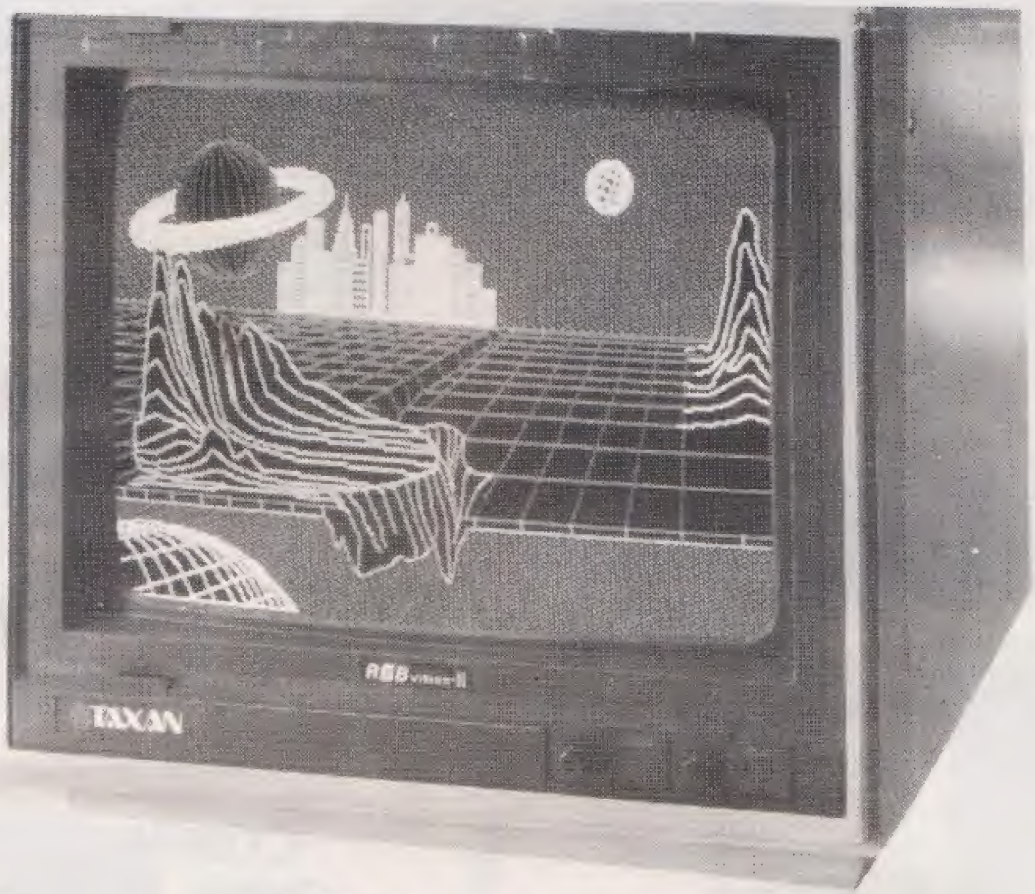
Telephone: (03) 561 8497. System Operators: Bob Cooban and Martin Scerri. IBM PC program downloading. Hours: 24 hours daily.

East Ringwood RCPM

Telephone: (03) 870 4623. System Operator: Mick Stock. Hours: 4pm–midnight Monday-Friday ONLY.

Gippsland RCPM

Telephone: (051) 34 1563. System Operator: Bob Sherlock. Hours: 24 hours daily.



From as low as $399
12 months warranty

Taxan RGB vision color monitors give you a lot more than a beautiful display.

The TAXAN RGB vision color monitors from Kaga electronics display a lot more than superb color graphics. They display years of painstakingly acquired know-how and a genuine dedication to incorporating the most advanced technology available in every model available anywhere, and at a surprisingly low cost.

RGB VISION EX

- Now in full audio capabilities. Also suits VCR Videotex.
- For better results with all Commodore BBC/Electron, Microbee, Tandy, Dick Smith computers.
- Low-cost, compact 12 inch color display of outstanding quality.
- Equipped with a smoked filter to reduce eye strain.
- Linear amplifier permits display of virtually an unlimited number of colors.

Price $399 inc
$349 exc
SAVE $130

RGB VISION II

- Suitable for the popular apple and apple look alike.
- 12 inch color display capable of displaying 2000 characters.
- Wide range of uses including industrial, commercial and medical applications.
- Equipped with a smoked filter to reduce eye strain.

Price $499 inc
$449 exc
SAVE $150

RGB VISION III

- Ideal for computer graphics due to faithful reproduction of intermediate colors.
- Ideal for high resolution. IBM cable option.

Price $699 inc
$599 exc
SAVE $170

RGB VISION IV

- Super high resolution graphics. Ideal for CAD & CAM. Call for special price.

Available from

DATA PARTS

YOUR KAGA SPECIALISTS

SIMPLY TOP VALUE

MICROFRAZER — THE PRINT BUFFER THAT REMEMBERS IT ALL

$339

Microfrazer. It remembers what all the others forget. In fact it remembers nearly twice what most others offer.

BMC

HI-RES MONITOR

18 MHz, 80 col . . . suits Apple, Microbee, Commodore, Executive, Osborne, IBM etc.

$169 incl

Saves time and money and is incredibly easy to operate.

FULLY AUTHORISED IBM DEALERS

IBM

SOFTWARE (inc tax)

- LOTUS 1, 2, 3 SYMPHONY ..... CALL
- D BASE 11 ..... $495
- WORD STAR PRO PAK $489

HARDWARE all prices inc. tax

- IBM PC 256K with 320K drive, monitor & printer interface. **$3980.00**
- Check our range of printers, Monitors & add on boards to suit.

DEC RAINBOW COMPUTER

Demo specials (2 only) at $3950 inc tax SAVE $1480

NEW LOWER SCHOOLS PRICE (only)

BBC Model B

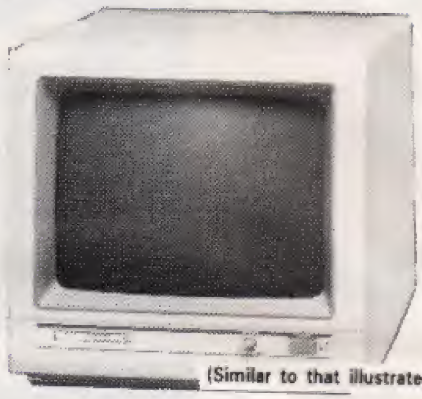
Recommended by Education Dept. in most states. **$859** excl

Or new 'ACORN' Electron **$389** (exc)

IMPORT BONANZA $139 (exc)

TAXAN GREEN DISPLAY MONITOR

Model 1203



(Similar to that illustrated)

This high resolution 12 inch display is ideal for displaying sharp characters and computer graphics. graphics.

SUPER HI-RES (exc tax) $139
(inc tax) $159

Also available in amber.

COMMODORE 'SUPER' FAMILY PAK

Includes Dataset 4 top programs Joystick and now the super expander **$468**

YES — WE DO HAVE THE FULL RANGE OF COMMODORE

*COMMODORE	Price (inc. tax)
1541 DISK DRIVE	385.00
802 PRINTER	399.00
1701 MONITOR	425.00
64 COMPUTER	365.00
COMMODORE 2031 DISK DRIVE	349.00
64' REFERENCE GUIDE	20.00
DATASET	45.00
KOALA PAD	129.00
EASY SCRIPT	79.00
SIMONS BASIC	69.00
RIFLE PRACTICE with real look rifle & s/ware	49.50
64 FLIGHT SIMULATER	69.50
PRINTRON INTERFACE	99.00

★ Save on IBM Ram Kits 4164 **$49 inc nc**

*APPLE COMPATIBLE	Price (inc. tax)
Z80 CARD	54.00
SNAPSHOT CARD	120.00
80 COL	84.00
DISK CONTROLLER	54.00
PARALLEL PRINTER CARD & CABLE (Auto ice)	89.00
COOLING FANS	49.00
JOYSTICKS	39.00
PADDLES (Pair)	39.00
RGB CARD (with 80 col adaptor)	129.00

*MEMORY COMPONENTS	(exc. tax)
6116 RAM	5.68
4116 RAM	1.59
4864 RAM	4.95
2764 ETROM	6.99
2716/2516	3.80

Prices are subject to change without notice. This ad must be quoted to quality for special price.

★Printers	(Incl. tax)
DT80	284.00
Epson RX80	super price POA
Epson FX80	super price CALL
Star Gemini 10X	CALL
Amust 120	399.00
Diablo Xerox 630	1698
DT 100	319.00
Praxis 40	695.00
C. Itoh Color Printers	CALL

★ Cables (Printer)	(Incl. tax)
Serial — serial	19.95
Centronic — Centronic	29.95
Microbee Cable	39.95
Centronics plugs (solder type)	4.90
Paper Special	
10" tractor feed top quality — box 2000	39.00

Add $4 freight per order anywhere in Australia.
or $10 overnight almost anywhere. (Comet).

A better run for your money

10 high quality diskettes for only $19.95 (exc)

Data Parts Diskettes
High quality DDSS diskettes, plastic library box, famous manufacturer, 5 year warranty.

$24.50 (inc)

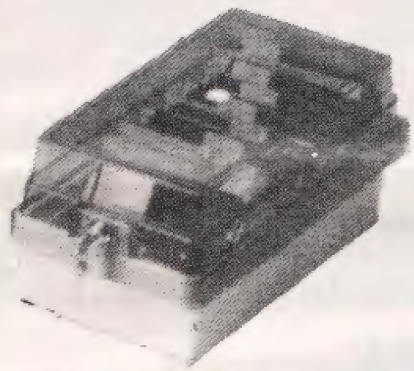
By Verbatim
or buy 100 diskettes for **$168 (exc)**
$198 (inc)

Chinon disk drives

Built for high precision, high quality and high durability.
Ideal for use with TRS 80, Microbee, IBM, etc, etc.

CHINON MODEL F051D
Double density, slim drive, single sided.
$129 exc ($149 inc)

CHINON MODEL F502
Double density, slim line drive, double sided.
$199 exc ($239 inc)



Model DX85 holds 85 disks — $22.50
Model DX50 holds 50 disks — $19.50

The Two-in-One MAGIC TOUCH PAD with joystick

- Use it as a graphic tables to write or draw on your computer screen.
- Use it as a paddle controller or joystick; compatible with most game software.
- Create a custom keyboard with outlays and software.
- Create charts, play games, etc.

To suit Apple 2 & 2E.

"SUPER FAST" COMMODORE DISK DRIVE

$598
EXC
($698 incl tax)

Up to 10 times faster, heavy duty mechanism, plug directly into 64 (interface included), 6 months warranty.

COMPATIBLE DISK DRIVES

ON QUALITY IMPORTED APPLE COMPATIBLE DISK DRIVES. MODEL AD501. ($199 inc. tax).

$169.00 (EXC.)

APPLE JOYSTICK

Self centering, mech & electricly, one metre cable, high tensile recoil

$39 normally $59

OUT BEST QUALITY EVER

Total freight charges $4 per order anywhere in Australia or O/night (Comet).
Prices are subject to change without notice. This ad must be quoted to qualify for special price.

TRADE ENQUIRIES WELCOME **CASH/CHEQUE OR BANKCARD WELCOME HERE**

DATA PARTS

MAIL ORDER CENTRE
11 EDWARDS STREET,
SHEPPARTON VIC 3630
Telephone: 21 7155 (058)

- **ALBURY 658 Dean Street Telephone: (060) 21 8088.**
- **BENDIGO 419 Hargreaves Street Telephone: (054) 43 4866.**
- **SHEPPARTON (as above) Telephone: (058) 21 7155.**
- **BALLARAT 307 Mair Street Telephone: (053) 31 3399.**
- **WAGGA 33 Thompson Street Telephone: (069) 21 6466.**
- **MELBOURNE: Noel Morley (03) 336 1845.**

You'll see that the best needn't cost the most

NEW MODEL

NLQ means Near Letter Quality, almost the same as a Daisywheel. Seeing is believing with this printer.
Also: 120 CPS, Epson MX80 compatible, IBM matrix and graphics compatible, 1.6K buffer, proportional spacing, 10 pitch, 12 pitch, fabric or carbon ribbons.

P88/2 (Super 5)

WITH EXTERNAL NLQ SWITCH, $325 exc $389 inc

STAR GEMINI 10X

$289 exc $339 inc

Fast 120 CPS, cloth ribbon (not carbon).
Friction and tractor, roll paper feed.
Commercial quality, diecast base.

We cannot be beaten on price.

PRINTERS —

No matter what make or model we will have it.

OSBORNE EXECUTIVE

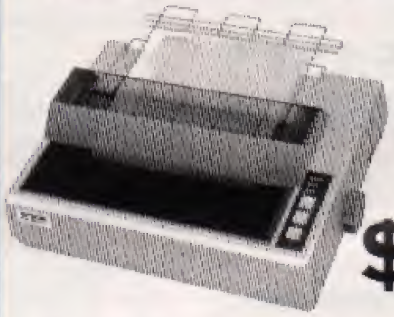
The big brother to the Osborne 1, the magificent Osborne Executive features all screen multi formate compatability software as per Osborne 1 plus Personal Pearl Data Base & UCSD system.

★ **Ask about special printer offers.**

The simply affordable

EPSON

Personal Printer with tractor feed



New low price

$398 (inc)
$349 (exc)

Easy to use, easy to own

ROM expansion to 8KB, and extended functions make the RX-80 easy to use, and its affordable price makes it the cost performance leader.

Freight $4 anywhere in Australia. Prices are subject to change without notice. This ad must be quoted to quality for special price.
Or $10 overnight most places (Comet).

TRADE ENQUIRIES WELCOME — CASH/CHEQUE OR BANKCARD WELCOME HERE

DATA PARTS

MAIL ORDER CENTRE
11 EDWARDS STREET,
SHEPPARTON VIC 3630
Telephone: 21 7155 (058)

- ALBURY 658 Dean Street Telephone: (060) 21 8088.
- BENDIGO 419 Hargreaves Street Telephone: (054) 43 4866.
- SHEPPARTON (as above) Telephone: (058) 21 7155.
- BALLARAT 307 Mair Street Telephone: (053) 31 3399
- WAGGA 33 Thompson Street Telephone: (069) 21 6466
- MELBOURNE: Noel Morley (03) 336 1845.

NETWORK NEWS

Mail-Bus

Telephone: (051) 27 7245. System Operator: Max Moore. Person-to-person mail. Multi-player games and bulletin board coming. Membership required for virtually all facilities. Write to M Moore, PO Box 234, Newborough, Vic 3825. Hours: 24 hours daily.

Software Tools RCPM

Telephone: (07) 378 9530. System Operator: Bill Bolton. Program down-loading. Hours: 24 hours daily.

Adelaide Micro User Group BBS

Telephone: (08) 271 2043. Hours: 10am–10pm, weekends and public holidays. 9am–9pm weekdays.

Computer Ventures CBBS

Telephone: (08) 255 1946. System Operator: Daniel Schumacher. Hours: 24 hours daily.

Omen II

Telephone: (089) 27 4454. System Operator: Terry O'Brien. Hours: 24 hours daily.

Outback RCPM

Telephone: (089) 27 7111. System Operator: Phill Sampson. Hours: 24 hours daily.

OMEN III

Telephone: (09) 279 8555. System Operator: Greg Watkins. Hours: 24 hours daily.

New Zealand Systems

NZ Micro Club RBBS

Telephone: 0011 64 9 762 309. System Operator: Chris Cotton. Hours: 24 hours daily. Software up/down-loading. Type "help" (in lower case) to log in.

This information is correct and current to the best of our knowledge. Please send corrections and updates to: Steve Withers, C/- *Australian Personal Computer*, 77 Glenhuntly Road, Elwood, Victoria 3184.

Overseas systems

North America

SYSTEM	*NUMBER*	*NOTES*
SPACE Citadel	0011 1 206 839 4759	
Okoms Citadel	0011 1 206 329 0436	
Eskimo North Minibin	0011 1 206 527 7638	
Conn-80	0011 1 212 441 3755	TRS-80 Color Computer
CLEO	0011 1 213 618 8800	Job vacancies
Mindstorm Network	0011 1 812 235 0908	Networked BBSs

EUROPE

ELFA ABC-MONITOR, Sweden	0011 468 730 0706	Half Duplex
ABC-Banken, Sweden	0011 463 511 0771	
ABC-MONITOR, Sweden	0011 468 801 523	Password required
CBBSD Gothenburg	0011 463 129 2160	75/1200 baud
CBBS Sweden*	0011 463 169 0754	
BUG, Sweden	0011 468 463 528	BBC Micro
XO-BBS Helsinki	0011 358 072 2272	
Commodore BBS, Finland	0011 358 116 223	
Tedas, Munich	0011 49 89 596 422	
Decatex, Germany	0011 49 68 154 51433	

UK

CBBS South West	0011 44 626 890 014	
Liverpool Mailbox	0011 44 51 428 8924	
BASUG	0011 44 742 667 983	
Computer Answers	0011 44 1 631 3076	
CBBS Surrey	0011 44 4862 25174	
Blandford Board	0011 44 258 54494	
Microweb TBBS	0011 44 61 456 4157	BBC Micro
Stoke Information Technology Centre RCPM	0011 44 782 265 078	
Clinical Notes Online	0011 44 254 60339	

Africa

Connection 80, Cape Town	0011 27 21 457 750
TRShop, Cape Town	0011 27 21 5362
Clan Computers, Durban	0011 27 31 66356
Peters Computers, Johannesburg	0011 27 11 834 5134
Peters Computers, Johannesburg	0011 27 11 834 5135
War Games, Johannesburg	0011 27 11 642 3722

* After receiving the tone and connecting your modem, either type <C. R> or <COM C. R>. The system then asks for a password which is 'cbbs' in lower-case letters. If you only get a '>' from the system it needs resetting, so type <D. C. R.

THE BEST HOME COMPUTER PACKAGE EVER OFFERED

THIS OFFER ONLY AVAILABLE DIRECT FROM US (T.T.S.)

SAVE OVER $100

A 5 HOUR COMPUTER COURSE IN USING YOUR SEGA

All This For Only $479.00.

1 SEGA SC3000H Home computer
1 SEGA SR1000 Data recorder
1 Arcade style joystick
1 Supertape (6 programmes)
1 T.T.S. SEGA Computing magazine
4 Top range T.T.S. games programmes
1 5 hour computer course (From J.S.E.)

Order your "Computer Pack" TODAY

Some of the Software available!

Recreational:	
Vortex Blasters	T $19.95
Vermin Invaders	T $19.95
Demon Gobbler	T $19.95
Transylvania Castle of Horror	T $19.95
Borderline	C $39.95
Exerion	C $39.95
Champion Golf	C $39.95
Champion Tennis	C $39.95
Safari Racer	C $39.95
Orguss	C $39.95
Sinbad Mystery	C $39.95
Eductional:	
Basic 1 Tutorial	T $19.95
Metric Mentals	T $19.95
Whiz Kid Mental Arithmatic	T $19.95
Learn The Alphabet	T $19.95
Learning To Count	T $19.95
Spelling Tutor	T $19.95
General Purpose:	
Mailing List	T $19.95
Sega Word Processor	T $19.95
Books:	
Great Programmes for your SEGA	$ 9.95
Programming your SEGA	$19.95
BASIC Level III	$19.95
T.T.S. SEGA Computing Magazine	$ 4.50
1 Year Subsciption	$45.00

C = Cartridge T = Tape

Hardware.

SEGA SC3000H 48K RAM, 32K ROM	$349.00
SEGA SR1000 Data recorder	$99.00
SEGA SR0400 Colour plotter/printer	$309
SEGA SJ0300 Joystick	$27.50
SEGA SF7000 Super control station/disk drive	$599.00
SEGA SE 0101 Music recreational cartridge	$99.00

John Sands Sega SF7000 Super Control Station/Disk Drive.

- Total technology 3 inch micro disk drive.
- 156K bytes working capacity. 312K bytes storage capacity.
- High speed. (Baud transfer rate 250K).
- RAM Memory expansion 80K bytes total RAM.
- Centronics and RS232C interfaces.
- Extended BASIC language.

$599.00

John Sands Sega SC3000H Home Computer.

Hard typewriter style keys. 48K total RAM. 32K total ROM. Expandable to 80K RAM.

- High level BASIC language.
- High resolution graphics.
- 32 graphic sprites.
- Standard typewriter key layout
- Multi-function keyboard
- Full, on-screen editing.
- 48 single keystroke commands.
- 16 colours.
- 3 channel, 5 octave sound range
- Connects to either colour or B&W television set, or video monitor.

John Sands Sega SP400 Plotter/Printer.

- High resolution plotting.
- Four colors.
- Multi-directional printing.
- Programmable character size

$309.00

ORDER FORM: Post to: T.T.S., P.O. Box 486, Coogee, N.S.W. 2034

(02) 344-8783

NAME

ADDRESS

POSTCODE

Have you purchased from us by Mail Order before?

☐ YES
☐ NO

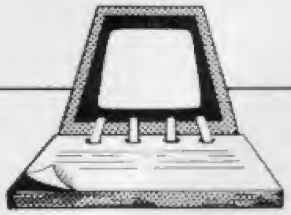
Cat. No.	Qty	Description	Price	Total
			Postage & Handling	$2.00
			TOTAL	

I Enclose ☐ Cheque ☐ Money Order

OR Debit My Bankcard
Or Mastercard

Exp. Date | Cardholder's Signature

TRIDENT TECHNOLOGICAL SYSTEMS, 73 NEW ORLEANS CRESCENT, MAROUBRA, 2035.



DIARY DATA

DIRECT ACCESS

Readers are strongly advised to check details with exhibition organisers before making travel arrangements to avoid wasted journeys due to cancellations, printer's errors, etc.

Singapore	Instrumentasia '85 Contact: Singapore Exhibition Services Pty Ltd, 11 Dhoby Ghat 15-09, Cathay Building, Singapore 0922 Tel: 338 474	Jan30–Feb2, 1985
Sydney	4th *Australian Personal Computer* Show Contact: Australian Exhibition Services Pty Ltd, Suite 3.2 Illoura Plaza, 424 St Kilda Road, Melbourne 3004. (03) 267 4500	March 13–16, 1985
Perth	Computers '85 Computer Exhibitions International, 190 Hay Street, East Perth 6000	May 1–4, 1985
Sydney	Data '85 Contact: Graphic Directions, 28 Foveaux Street, Surry Hills, 2010. (02) 212 4199	May 22–25, 1985
Melbourne	5th *Australian Personal Computer* Show Contact: Australian Exhibition Services Pty Ltd, Suite 3.2 Illoura Plaza, 424 St Kilda Road, Melbourne 3004. (03) 267 4500	July 17–20, 1985

Which computer:
supports 5 users
Labnet networking system
incorporates 8 & 16 bit processors
800K floppy disk drive
10 meg Winchester
Concurrent CPM
640K RAM
has dual printer capabilities
is delivered within 30 days from order
and only costs $8600*?

*One memory-mapped terminal provided only.

The Labtam 3003
desktop computer

For further information contact:
Sydney: 411 2588, Melbourne: 587 1444, Queensland: 352 5166, Adelaide: 260 0133, Perth: 342 9721.

BENCHMARKS

A list of Benchmarks used when evaluating micros is given below.
An explanation can be found in the February '84 issue.

```
100 REM Benchmark 1
110 PRINT "S"
120 FOR K=1 TO 1000
130 NEXT K
140 PRINT "E"
150 END
```

```
100 REM Benchmark 2
110 PRINT "S"
120 K=0
130 K=K+1
140 IF K<1000 THEN 130
150 PRINT "E"
160 END
```

```
100 REM Benchmark 3
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/K*K+K-K
150 IF K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN
```

```
100 REM Benchmark 6
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB220
170 FORL=1 TO 5
180 NEXTL
190 IF K<1000 THEN 140
200 PRINT "E"
210 END
220 RETURN
```

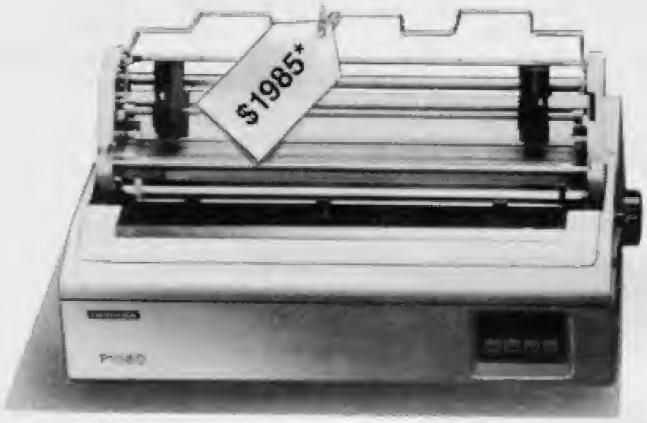
```
100 REM Benchmark 7
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 230
170 FOR L=1 TO 5
180 M(L)=A
190 NEXTL
200 If K<1000 THEN 140
210 PRINT "E"
220 END
230 RETURN
```

```
100 REM Benchmark 8
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K^2
150 B=LOG(K)
160 C=SIN(K)
170 IF K<1000 THEN 130
180 PRINT "E"
190 END
```

利己心

"Ask not what your printer can do but what it can do for you."

New Japanese Proverb



P 1350
A multi-mode 24 pin printer
Full width carriage
Draft mode 192 characters per second
Letter quality 100 characters per second
Graphics 180 x 180 per inch

P 1351
Has all the functions of the P 1350 with the addition of extra memory so as to allow down-loading of fonts. Comes with a wide choice of fonts on a floppy disk.

P 1340
A multi-mode 24 pin printer
80 column (132 condensed)
Draft mode 144 characters per second
Letter quality 57 characters per second
Graphics 180 x 180 per inch

The very first thing you do when you go shopping for a printer is establish clearly not only what you need it for right now but also what you may need it for later.

The P1300 series printers come equipped with enough features to last you a long, long time. They grow as your needs grow so you don't need an expensive update every couple of years. They were built after thorough research into the most common uses for a printer in business, educational and technical applications.

But most importantly the P1300 series has one feature you cannot do without in a printer – RELIABILITY. There is an installed base of over 3,500 P1300 series printers, that have proven to be exceptionally reliable. We believe that no other printer on the market can claim this outstanding success.

TOSHIBA

Toshiba (Australia) Pty. Limited E.O.E. Division 84-92 Talavera Road North Ryde, N.S.W. 2113

For more information phone: (02) 887 6057

*recommended retail price ex-tax for printers only. Price does not include sheet feeder or tractor feeder.

Juki 6100

Simon Craven looks at the Juki 6100, an inexpensive, letter-quality daisywheel printer, and is suitably impressed.

There's never been a better time to buy a computer printer but, paradoxically, choosing which one to go for has never been more difficult. The latest round of price reductions has brought daisywheel printers down to a level previously occupied by draft-quality, dot matrix types, so the main criterion for selecting something suitable for your particular application is the kind of compromise you are prepared to strike between speed and print quality.

The Juki 6100 certainly offers excellent print quality for a $720 unit, but the *other* price you pay is a speed of only 18 characters per second. A $720 dot-matrix printer can be expected to zip along at up to 100cps, dropping to about half that figure in a double-strike 'correspondence quality' mode.

Whether this is important to you depends mainly on the length of your printing tasks. The Juki comes into its own for letters, when the delay is never long enough to be irritating. However, with an article of 2000 words or more, the speed differential is more noticeable: the Juki takes about 12 minutes to stutter it out, against two and a half minutes for a typical mid-range dot-matrix printer.

Hardware

If your desire to see fully-formed characters marching crisply across the page overrides your impatience, then the Juki 6100 has much to recommend it. Daisywheel printers are traditionally bulky, heavy pieces of equipment which threaten to shake the house down when they burst into *staccato* action; the Juki breaks with that line of development. Its overall dimensions are 20.5 × 5.9 × 14.2ins, making it a sensible choice if you want your computer system to leave a couple of square inches free on your desk top. This is about six inches wider and two inches deeper than an Epson FX80 dot matrix printer, but a couple of inches smaller in those same dimensions than the main daisywheel rivals.

Nor will you need to weld bracing struts to the furniture before putting your new 'toy' online. It weighs in at 27lb — about 10lb less than much of the competition — and the low weight of the moving parts keeps vibration at acceptable levels.

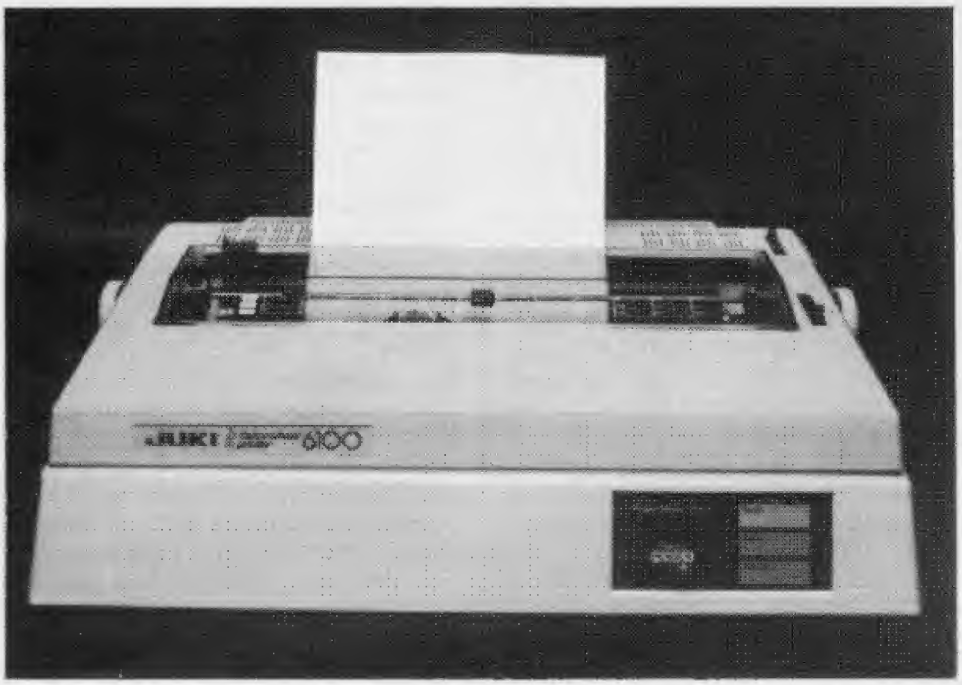
Noise is frequently the Achilles' heel of a daisywheel printer, but I found the Juki subjectively less irritating than an Epson FX80. Although the noise continues for a longer period than a dot matrix type, being much lower pitched the irregular beat of the daisywheel is less annoying than the predictable scream of the Epson.

The physical design of the printer is very thoughtful. An injection-moulded plastic case keeps the internals free of dust, and the dust cover-*cum*-acoustic muffler is engraved with typescales for the three type pitches (10, 12 and 15) which the Juki can produce. All the controls are easy to reach, and include two platen knobs instead of the one that many printer manufacturers provide.

The front-mounted control panel is slightly unusual. A small slider control is an immediate attention-grabber: it allows you to change the pitch setting without sending special codes through software or fiddling about with internal DIP switches. But you can't change horses in mid-stream: once it has been moved to a new position, the printer must be turned off and then on again to reset it to the new parameters.

WordStar users, indeed, anyone whose word processor allows the use of an alternative character set, can still use software control to alternate between, say, 10-pitch and 12-pitch.

There are three touch-sensitive keys to the right of the slider, but instead of the normal Line Feed, Form Feed and On Line/Off Line toggle, you get separate keys for Off Line (here marked Pause) and On Line (marked Reset). The Form Feed function remains, but Line Feed is not present.



One of the most inconvenient aspects of many printers is gaining access to the DIP switches, but the Juki is definitely superior in this respect. All you have to do is pull off the top part of the case and a single bank of switches is revealed — no screws to undo, no need to remove the ribbon nor the paper. It is, however, a good idea to switch off the power before you get stuck in!

The functions of the switches themselves are straightforward enough. Switch 1 determines whether or not a carriage return should automatically imply a line feed, and switches 4 to 6 are used in various combinations to select one of the eight international character sets available. Switch 7 distinguishes between continuous stationery and single sheets, 8 gives two choices of form length, and 9 provides two options for the spacing between lines.

So far, so conventional, but switches 2 and 3 offer a little more of interest. Switch 2 selects one of two levels of daisywheel impact. In my case, the lower intensity setting proved more than adequate for normal use, and probably reduced wear and tear on the plastic daisywheel supplied, but if you want to produce a clear impression through weighty wads of carbon paper then you can turn the power up.

Switch 3 is aimed at users of the IBM PC. The PC has a couple of idiosyncratic tricks up its sleeve, including a habit of cutting off diplomatic relations with any peripheral it hasn't heard from for a while. If a signal is not received from the peripheral, be it a modem, printer or plotter, then the communications channel is closed after a certain period of time. This can cause problems with parallel printers, as the PC gets impatient when it fills the Juki's 2k buffer and can't send any more data.

A couple of software patches are recommended in the manual. Setting switch 3 to ON sets the scene by selecting the appropriate mode for the buffer's data processing.

Setting up

Hooking up your computer to a Juki 6100 is unlikely to cause too many problems. The standard parallel interface, using an ordinary Amphenol connecter, can be supplemented by an RS232 serial interface at extra cost. The codes which turn on and off various features such as underlining, shadow, bold and double printing, as well as superscripts and subscripts, have been made identical to those used by the Diablo 630. Any piece of software which includes a printer installation menu is likely to include a driver suitable for the Juki.

This compatibility with convenient standards also extends to the ribbon, which is like that of an IBM Selectric typewriter. Supply of single-pass carbon ribbons and the more durable multi-strike cloth ribbons is unlikely to cause any headaches. Using single-pass carbon ribbons makes the print quality especially crisp and clear, but the traditional drawback is the need to buy a replacement ribbon at short intervals. The 6100 does a very good job at squeezing the most out of its ribbons, striking each bit of the ribbon in three vertically arranged tracks. The ribbon life is 160,000 characters, or about 27,000 words, although the multi-strike cloth alternatives should be good for at least 100,000 words before the print becomes faint.

The advantage of a cloth ribbon is not the decrease in running costs, of course — it's the progressive way the ribbon wears out. If you stick to carbon ribbons the time will come when, say, it's eleven o'clock on Sunday evening and your last ribbon runs out in the middle of printing a 12-page report which has to be on somebody else's desk by nine o'clock the next morning. If you have a cloth ribbon, you can always squeeze a few more pages of print out of it, even if the quality isn't everything you might have hoped for.

The other major consumable with a daisywheel printer is the daisywheel itself. Plastic wheels like the one supplied with the printer have a low initial cost, but in the long-run their higher rate of wear makes them less economical than metal wheels. The daisywheels used are compatible with those used on Adler machines, so there should be no difficulty in getting hold of your required typeface.

Documentation

The unusually high quality of the documentation which accompanies the Juki 6100 is a powerful incentive for selecting this product over some of the alternatives. In an ideal world, all computers, software and peripherals would come with a manual this good.

All the usual information is supplied in a clear and concise format, and the well-designed contents pages make it easy to get straight to whatever snippet you are looking for. There's also a decent index — a feature noticeable by its absence on too many computer products. It's all beautifully written with a noticeable American idiom which manages not to get in the way of the information, and never skimps on the well-presented technical information. The design is clear and entertaining, with numerous cartoons injecting a little levity into what could too easily become a dull subject.

What makes the documentation stand out in terms of content as well as presentation is a series of chapters devoted to interfacing the Juki to the most popular personal computers, and the most likely choices of word processing software for those systems.

The computers covered are the IBM PC, Apple II family, Kaypro II, Osborne 1 and TRS-80 Model III. The software featured is mainly the relevant versions of WordStar, although Perfect Writer also puts in an appearance and the Tandy chapter goes into Superscript. The explanations of how to get the most from your system even suggest using DEBUG.COM to patch your WordStar program files.

'Hooking up your computer to a Juki 6100 is unlikely to cause too many problems. The standard parallel interface, using an ordinary Amphenol connecter, can be supplemented by an RS232 serial interface at extra cost.'

Optional extras

Optional extras for the 6100 include a continuous stationery tractor-feed device with an accompanying end-of-paper detector. Another possible enhancement is the expansion of the 2k static RAM print buffer to 8k, just by plugging in 2k RAM chips until the desired capacity is reached. A list of compatible memory chips is given in the manual, along with full fitting instructions.

Conclusion

Overall I was very pleased with the Juki 6100. With the prices of this class of product falling steadily it's difficult to make specific recommendations about the value for money offered by various competitors, but operationally the Juki is extremely competent with no noticeable weak spots.

If you are in the market for a low-cost letter-quality printer, I can foresee few grounds for dissatisfaction with the 6100. END

How about these New Year Specials from

COMANDGLEN PTY LTD

COMMODORE

Commodore Family Pack	430.00
Commodore 64	385.00
Commodore SX64	1250.00
1541 Disk Drive	380.00
802 Printer	450.00
1701 Colour Monitor	430.00
Plus more!	

STAR PRINTERS

Gemini 10X 120CPS	345.00
Gemini 15X 120CPS	630.00
Delta 10 160CPS	600.00
Delta 15 160CPS	850.00
Radix 10 200CPS NLQ	1300.00
Radix 15 200CPS NLQ	1400.00
Powertype Daisywheel 18CPS (incl. Tractor)	650.00

MEMOREX

SSSD 5.25 inch	24.00
SSDD 5.25 inch	28.00
DSDD 5.25 inch	35.00
SSSD 8 inch	45.00
SSDD 8 inch	50.00
DSDD 8 inch	55.00
3.5 inch	65.00

STORAGE BOXES

DX50 5.25 inch	20.00
DX85 5.25 inch	28.00
3.5 inch box cap. 40	25.00
5.25/8 inch library boxes	6.00

PAPER

9.5 x 11 60 gsm 2000 sheets	35.00
9.5 x 11 70 gsm 2500 sheets	50.00
True A4 70 gsm 2500 sheets	55.00
15 x 11 BMO 2500 sheets	35.00
Plus multiform carbon incl. and carbon less	

MISCELLANEOUS

Monitor amber/sound 35 mhz	190.00
Printer Interface for Commodores to suit most parallel printers	100.00
Smart Cable Instant RS232 Connection	140.00
Data Cartridges	from 40.00
Printer Cables parallel or serial custom built	from 30.00

SOFTWARE

COMMODORE

Flight Simulator	70.00
Beach Head	40.00
Lode Runner	36.00
Basic St Writer	70.00
80 Col Card	230.00
Home Entertainment	

APPLE

Flight Simulator	70.00
Basic St Writer	80.00
Load Runner	42.00
Zaxxon	55.00
Plus Apple Hardware	

ATARI

Mastertype	60.00
Castle Wolfenstein	35.00
Zaxxon	40.00
Pooyan	34.00
Plus Other Home Entertainment	

** All prices include sales tax*

811 Warringah Rd, Forestville 2087.
Ph: 452 4867

Phone 7 days a week or mail orders to the above address

Also Distributors for

MEMOREX — DISKETTES/TAPES
CASE COMMUNICATIONS — PRINTERS
COMMODORE
SNAP APART. — PAPER SUPPLIES
ADVANCE — PRINTER RIBBONS
IMAGINEERING — SOFTWARE SUPPLIES

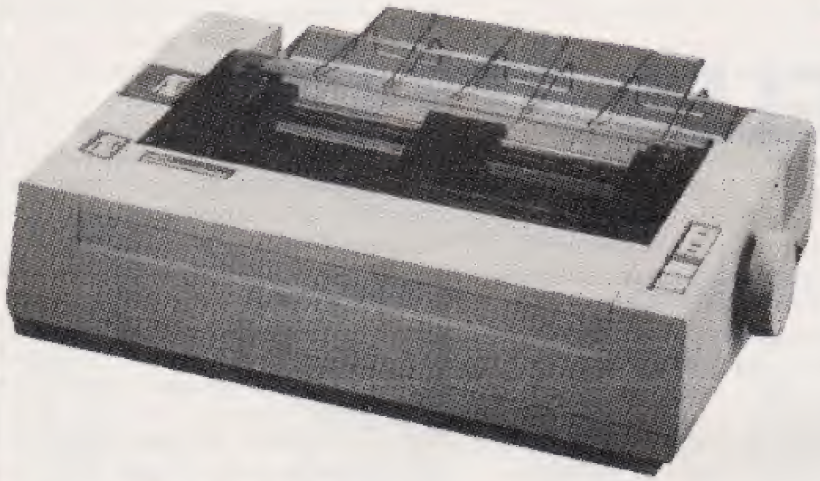
TWO NEW PRINTERS FROM PORCHESTER

1. LOGITEC FT5002 FROM KANTO DENSHI CORP.
2. ADMATE DP100 FROM CORTON CORP.

DEALER ENQUIRIES WELCOME AS WE ARE THE AUTHORISED AUSTRALIAN DISTRIBUTORS

SEE FOLLOWING PAGES FOR OUR OTHER **SPECIALS** AND ORDERING DETAILS

LOGITEC FT-5002 WITH NLQ only $399 inc $359 ex



FT-5002

DOT MATRIX PRINTER

OUR INSTANT BEST SELLER . . . with NLQ

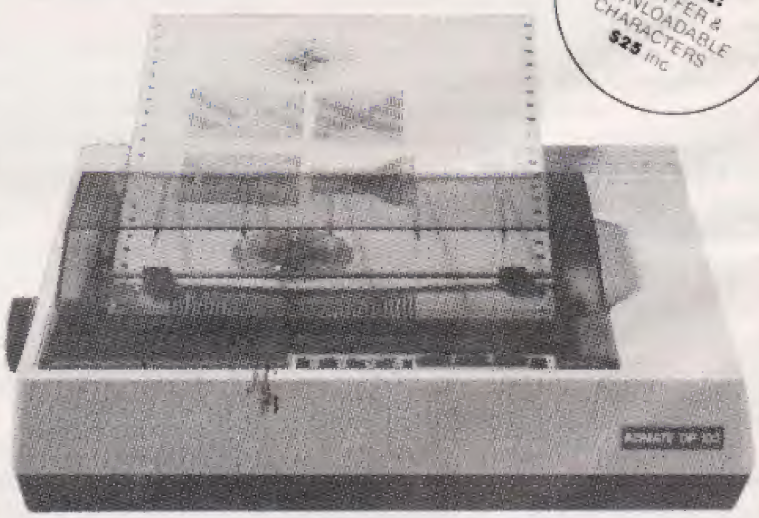
NLQ means Near Letter Quality almost the same as a Daisywheel. Seeing is believing with this printer. Also 120 CPS. Epson MX80 compatible. IBM matrix and graphics compatible. 1.6K buffer, proportional spacing, 10 pitch, 12 pitch, fabric or carbon ribbons.

LOGITEC FT-5002 FEATURES

Print Rate	120 cps (59 LPM)
Line Feed Speed	100 msec
Print Direction	Bi-directional with logic seeking
Input Buffer	1 KB
Character set	Standard Mode 96 ASCII characters with descenders 11 semi-graphics, 8 international characters Italic characters IBM-PC Matrix Printer Mode 96 ASCII characters with descenders 64 block characters, 9 international characters IBM-PC Graphic Printer Mode Additional ASCII contain European, Graphic, selected characters, math and extra symbols
Font Registration	Up to 40 characters
Character Structure	9 x 9
Character Size	Ordinary characters 1.99(W) x 2.24(H) mm Superscript/subscript characters 1.9(W) x 1.36(H) mm
Characters per line	Ordinary (pica/elite) 80/96 Double width elongated (pica/elite) 40/48 Compressed (pica/elite) 132/158 Compressed and elongated (pica/elite) 66/79 Superscript, subscript (pica/elite) 80/96
Paper Feed	Friction feed, Sprocket feed
Paper Width	Fanfold 4-10 inches Cut sheet 4-9 inches
Copies	3 max.
Interface	Standard Centronics-style 8 bit parallel Optional RS232C with 2K buffer (X/ON-X/OFF and ETX/ACK protocol)
Ink Ribbon	Cassette (Service life 3 mil characters)
Head Service Life	Over 100 mil characters

ADMATE 100 DP

SPECIAL FEATURE! 4K BUFFER & DOWNLOADABLE CHARACTERS $25 inc



100DP — FEATURES

Printing format	Alpha-numeric — 7 x 8in 8 x 9 dot matrix field. Semi-graphic (character graphic) — 8 x 8 dot matrix. Bit image graphic — Vertical 8 or 9 dots parallel. Horizontal 640 dots serial/line.
Character size	Normal size — 2.22(W)x2.8(H)mm=0.087"x0.11" Condensed size — 1.11(W)x2.8(H)mm=0.044"x0.11" Enlarged size — 4.44(W)x2.8(H)mm=0.175"x0.11" ELITE size — 1.8 (W)x2.8(H)mm=0.07" x0.11" Enlarged ELITE — 3.6(W)x2.8(H)mm=0.14"x0.11" Super/subscript — 2.22(W)x1.4(H)mm=0.087" x 0.0055" Semi-graphic unit — 2.54(W)x2.8(H)mm=0.1" x0.11"
Character sets	ASCII characters — 192 (96 normals and 96 italis) JIS characters — 160 (64 kalakanas and 96 alpha-numerics) Semi-graphic units — 103. International Specials — 2 for U.S.A., 1 for UK, 8 for German, 8 for French, 4 for Swedish, 2 for Italian, 6 for Spanish, 48 for Greek, 6 for Danish and 2 for Japan.
Printing Speed	100 C.P.S. for normal size print, 200ms for line feed.
Columns/line	Normal — 80 columns. Condensed — 142 columns. Enlarged — 40 columns. Condensed/double width — 71 columns. 'ELITE' — 96 columns. Enlarged 'ELITE' — 48 columns.
Printing direction	Text and semi-graphic — Bidirectional, logic ,seeking (programmable) Super/subscript and bit image graphic — Unidirectional left to right
Line spacing	6 L.P.I. — 4.23mm 8 L.P.I. — 3.18mm Programmable in increments of 0.35mm (1/72) and 0.118mm (1/216")
Paper feed	Adjustable sprocket feed and friction feed.
Paper type	Fanfold, Single sheet, Roll paper. Thickness — 0.05mm (0.002") to 0.25mm (0.01") Paper width — 101.6mm (4") to 254mm (10")
Number of copies	Original plus 2 copies by normal thickness paper.

NEW MODEL! 100DP PRINTER

Many more features than 80DT/BX80. Now has 100 CPS, 10 Pitch, 12 Pitch, Proportional Spacing, 8 Character Sets, etc., etc.

$325 inc.
$289 ex.

PORCHESTER Computers

DELIVERY AUSTRALIA WIDE

• MAIL ORDER • PHONE ORDER • CALL-IN

Operate most popular printers from your Commodore serial port.

XETEC graphic interface: $125 inc.

- Total compatibility!
- 29 page instruction book.
- Performs Commodore's test / demo printer test faultlessly.
- 2 K buffer • 7 printing modes • 22 additional commands.
- Set device number with switch or software.
- list with graphic symbols OR mnemonics OR ASCII.
- Hi-res screen dump software.

OUR PRINTERS AND MONITORS RUN ON YOUR COMPUTER!

Printer cables/interfaces for:.....inc tax

KAYPRO	$45	APPLE	$99
OSBORNE	60	ATARI	125
IBM	69	COMMODORE	125
LINGO	39	APPLE 2C	99
MEDFLY	39	TANDY COLOR	99
MICROBEE	65	TANDY MODEL 3	39

MONOCHROME MONITORS

GINTAI HI-RES AMBER/GREEN	$149
KING FORD VERY HI-RES	199
KING FORD IBM COMPATIBLE	249

COLOR MONITORS

MED-RES RGB IBM, MICROBEE, ETC	499
HI-RES RGB IBM, SANYO, ETC	599

TWO GREAT HIGH QUALITY MONITORS!

HI-RES AMBER & GREEN — 20MHz

. . . for Apple, Microbee, Executive, Kaypro, Osborne, etc.

$149 inc.

VERY HI-RES AMBER — 30MHz

. . . for IBM PC/XT, Tilt/Swivel IBM Connec.

$249 inc.

DISK DRIVES

ATLAS 8 FOR YOUR APPLE

$175 inc.

$155 ex.

NATIONAL

FOR: IBM PC, Challenger, Columbia, Tandy, Eagle, Kaypro, Osborne, etc.

40 TK DSDD

$169 ex.

FOR: Apricot, Excalibur, Executive, Kaypro 4, etc.

80 TK DSDD

$199 ex.

IC's TO SAVE YOU MONEY!!

2764 EPROMS	164 RAM	2732 EPROMS
$5.90 ex.	$4.10 ex.	$4.90

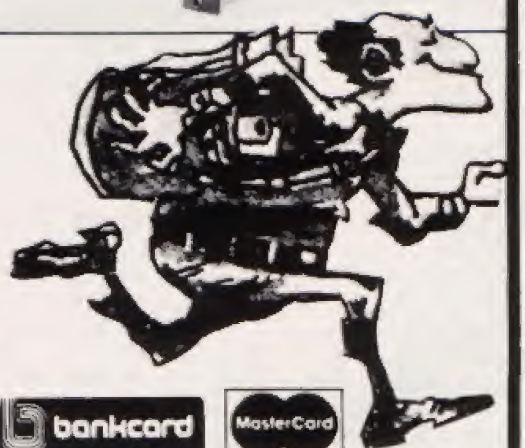
- **LOWEST PRICES**
- **FAST DELIVERY**

First Floor
169 Victoria Parade,
Fitzroy, Vic 3065

Both locations open:
10-6 Weekdays
9-1 Saturday

Also NOW at:
68 Punt Road,
Windsor, Vic 3181
(NEAR ST. KILDA JUNCTION)

(03) 417 6999 **(03) 51 7647**

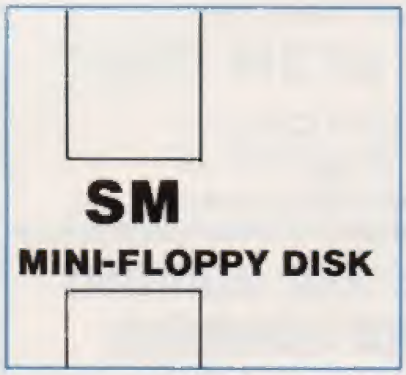


bankcard MasterCard

MAIL ORDERS • Send Cheque/Postal Order, or Bankcard details. PHONE ORDERS to above numbers.

DEALER ENQUIRIES WELCOME

6 MONTHS WARRANTY ON ALL PRODUCTS



2 FOR 1

YES!

FOR THE PRICE OF 1 BOX YOU GET 2 BOXES FULLY CERTIFIED AND TESTED WITH RING-HUP RE-INFORCEMENT

SPECIAL OFF
OFFER EXTENDED
to 31st January 1985
or while stocks last

Please use coupon at bottom of page

SPECIFICATIONS

PRINTING MECHANISM
Print Method: Impact Dot Matrix
Print Rate: 160 characters per second
Print Direction: Bidirectional in text mode
Unidirectional in bit graphics
Number of Pins in Head: 9
Line Spacing: 1/6", 1/8", n/72", n/216"
Programmable

PRINTING CHARACTERISTICS
Character Set: 96 ASCII Characters, with descenders, plus 9 International Character Sets and 96 Italic Characters 128 Downloadable Characters
Printing Modes: 9 x 9 matrix standard
(10 CPI) 11 x 18 double strike (advance paper 1 216" and repeat line)
18 x 9 emphasized (shift right dots)
18 x 18 double strike emphasized

INTERFACE
Standard: Centronics style 8 bit parallel
Multi Font Interface
Word Processing Card
Optional: RS-232C Inteligent Serial w/2K Buffer or 32K Buffer and XON/XOFF protocol
Centronics Parallel w/2K Buffer or 32K Buffer
Inteligent IEEE-488 Interface
Simple IEEE-488 Interface

ADMATE DP-160

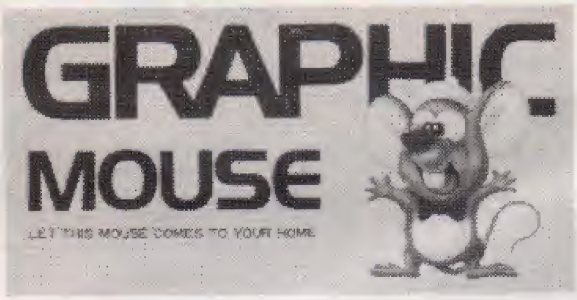
PERSONAL AND YET PROFESSIONAL

COMPATIBLE WITH FX10

PX120 NEAR LETTER QUALITY PRINTER

Friction and adjustable sprocket feeding.
Variety of printing modes (Draft, N.L.Q., Prop.).
User Font registry command.
Automatic paper insertion.
Multi-printer modes (STD, IBM Matrix, IBM Graphic).
On board memory buffer.

GRAPHIC MOUSE



Midasonic

- ★ Newly developed
- ★ Complete with graphic softwares
- ★ Menu driven
- ★ Compatible with Apple II and Apple IIe
- ★ Choice of many shapes, sizes and colours
- ★ Load and Save pictures created

Please send me
☐ boxes of SM discs
☐ D/D S/SD $38.00 for 2 boxes
☐ D/D D/S $48.00 for 2 boxes
Name
Address
Phone No

DIGITAL SOURCE INT'L PTY. LTD
169 Phillip Street, Waterloo N.S.W. 2017. Telephone: (02) 690 1268, 690
Telex: AA 7

LAZING AROUND

Brain teasers courtesy of J J Clessa

Quickie

What temperature is the same in Centigrade (Celsius) as it is in Fahrenheit?

Prize Puzzle

A certain 7-digit number contains no zeros and is not palindromic (that is, it does not read the same from right to left), but it does have the property that if its digits are reversed, the resulting 7-digit number is a factor of the original number. What is the original number?

Answers, on postcards or backs of envelopes only, to: *APC* Prize Puzzle, January 1985, Lazing Around, 77 Glenhuntly Road, Elwood, Victoria 3184. Entries to arrive not later than January 31, 1985

September Prize Puzzle

The answers are as follows:

(a) The largest perfect square with digits in ascending order is 134 689.

(b) The largest perfect square with digits in descending order is 961.

Winner: Sue Marshman of Yokine, WA. Congratulations!

BLUDNERS

In line 60 of the machine code programs for horizontal scrolling of the screen of the VIC 20 in TJ's column of the September '84 issue, 157,0 was printed twice instead of once in the data statement of the left to right program.

Page 21 of the November issue contained a reference to Vault Corporation's Prolok (anti-piracy protection) software. The phone number given was said to be for Vault Corporation in California. In fact the number was for Vault's Australian Distributors, Communication Control in Sydney.

APC SAMPLE SOFTWARE: If you've ordered the following disks: Electric desk, Attache Accounting, Aura, DR Draw, dBase III, DR Graph and SuperCalc III — you may be wondering why they aren't working. They've been copied incorrectly. We extend our sincere apologies and ask you to send back the disks to 54 Park Street, Sydney 2000. We'll supply you immediately with a good working copy.

Go to it

```
LOADGO"GOTO THOU
  SLUGGARD":
REM APC SEPTEMBER 84
RETURN without GOTO at
  line 15
Ready
EDIT 10
10 It seems . . . my point.
END
```

David Bradnack

CHIP CHAT

What bad luck for *Your Computer* that its attack on page 8 of its December issue came unstuck so quickly. No sooner had it touted its market leadership in the Audit Bureau of Circulations' sales figures than the Audit Bureau released its latest report (for the period April to September 1984). *APC* comes out with around 2,000 more copies sold per issue. Chip Chat reckons that the editorial pages of a consumer magazine are not the place to slag off the competition and *Your Computer's* resultant dilemma (subsequent to the Audit Bureau report) is its just deserts. Yer get whatcha gives . . .

Comments such as the above would not normally appear in the pages of *APC*. But in view of the full page prominence given to *Your Computer's* (short lived) claims, we felt justified in replying on these pages. And lastly, to refute another false claim of that magazine, *APC has* submitted itself to the Morgan readership survey. We'll probably break silence again to reveal these figures when they're released, because initial indications are that *Your Computer* will have egg on the egg on its face. The end.

US Gold, a software supplier for Commodore and Atari, has apparently caught the anti-Russian bug sweeping the US at the moment.

Its latest release is called Raid over Moscow, which it claims nice Mr Reagan was playing when he announced that US forces had been despatched to drop nasty things on the Soviet Union.

Americans make hard-headed businessmen, it's well known, but their trade shows don't lack light relief.

One of the more novel programs announced in Las Vegas at Comdex was a music program for the Macintosh and Commodore 64. Called Macmusic and Computer Hitware respectively, the packages offer music composition and a string of pre-recorded pop hits from the likes of M Jackson, Lionel Ritchie and The Police. The company explains: 'We're working on the Michael Jackson aftermarket and taking it to the computer retailer.'

Over at Osborne, insomnia is probably a fact of life. The ailing company's latest blunder high lights another US characteristic — no sense of humour. Its public relations department threatened to charge newspapers $1.19 for a news release and $1.69 for a black and white photograph; one outraged editor is reported to have replied: 'If you can't afford to give a press conference, you're not worth writing about.' Osborne shyly admitted that the joke had backfired.

Bon appetit. APC's reporter at the Vidcom trade show in Cannes noticed a particularly interesting dish on the menu at the Palm Beach restaurant — Déjeuner au grill Commodore. He wasn't tempted.

ADVERTISERS INDEX

Commodore Makes Software For Every Member Of The Family.

Almost.

Commodore make software for people. All kinds of people. Software for fathers, mothers, brothers, sisters, uncles, aunts, nieces, nephews, grandparents and even brothers-in-law who fix cars. Everybody. Software for fun, profit, homework, housework and officework. We do not however, make software for dogs. Yes, we are working on it, but as research in this area is fairly limited, we're calling for all the help we can get. If you have any suggestions please contact your nearest Commodore dealer.

commodore COMPUTER

Keeping up with you.

Contact your nearest Commodore dealer or Commodore Business Machines:
Sydney: (02) 427 4888 Melbourne: (03) 429 9855 Brisbane: (07) 393 0745 Perth: (09) 478 1744

BMS/cc 30

ANOTHER HARD ACT TO FOLLOW!

Act's fixed removable disk systems give you MEGABYTES IN THE PALM OF YOUR HAND

COMPATABILITY

No matter which micro you have, you can make it ACT. The ACT fixed removable winchester is compatible with most micros —
• APPLE I & IIE • COLUMBIA P.C. • CORONA/WORDPLEX • DEC RAINBOW 100 • HEATH/ZENITH H89/Z89 • HITACHI PEACH • IBM P.C. • KAYPRO • MICROBEE • MORROW MICRO-DECISION • NEC APC • NORTHSTAR ADVANTAGE & HORIZON • OSBORNE I & EXECUTIVE • SANYO MBC-1000 & 555 • SIGMA/OKI MODELS 20 & 30 • SIRIUS • SUPERBRAIN I/II • TANDY II & III • TIME OFFICE • TOSHIBA T-300 • XEROX 820 • PANASONIC JB-3001 • AND OTHERS.

A GREAT STORAGE SYSTEM

Combine the best of two storage systems — the speed and capacity of a hard disk and the mobility of a floppy.
You can backup the days data, remove the disk and store it safely or carry it interstate in your briefcase — a great storage system!

AUSTRALIAN

You don't have to pay more to buy Australian!
ACT is manufactured in Australia and supported by an Australian organisation committed to backup support and service.
It's a professional ACT.

A DIVISION OF AUSTRALIAN PROTECTION INDUSTRIES

act

Australian Computer and Telecommunications
75 Willoughby Road, Crows Nest, NSW 2065.
Telephone 02 439 6300, Telex AA 24816

DISTRIBUTORS.

Direct Data, 1357 Malvern Road, Malvern, Victoria 3144. Telephone (03) 209 9045.
Computer Mart, 356A King William Street, Adelaide, South Australia 5000. Telephone (08) 51 5363.